Supporting people-centred design through information and empathy

A thesis submitted for the degree of Doctor of Philosophy

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Abstract

People-centred design is a design approach that takes the intended end users into consideration throughout the development process, resulting in more appropriate design output in terms of meeting peoples needs and wants. There is recognised value in the use of user-based information, and in establishing empathy with those being designed for, yet there is a distinct lack of literature addressing both aspects and the potential for associated support mechanisms for designers.

The combination of information and empathy is the focus of this research. This thesis presents studies carried out to investigate the potential for 'supporting people-centred design through information and empathy', focusing upon the early stages of design development. The main aims of this research were to understand designers' processes and where users fit into these, and to suggest means of support that could promote user focus whilst remaining a practical and appropriate complement to established methods.

The under-explored nature of this area required empirical research engaging in practical ways with designers, which was achieved through in-depth probe studies and follow-up interviews with 10 designers; active participation in two four-month real-life design projects; the examination and co-creation of resource tool concepts during two workshops, each with 20 design participants; and 'MHIRROR' (Means of Human Information Retrieval, Representation, Organisation and Reflection), a mixed media human information resource was developed and trialed with six experienced inclusive design practitioners.

These qualitative explorations with designers and within real-life projects facilitated understanding of the potential for human information resources to support the design process. The thesis has made original contribution to knowledge in terms of the formation of a framework for the manipulation and integration of human information into the design process; the iterative design and embodiment of a working prototype resource MHIRROR, and it has

provided insights into the value of information and empathy resource combinations and their potential to promote people-centred design.

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For Milo

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Glossary

Accessible - Ability to perceive, understand and physically interact with a designed artefact or service (Keates and Clarkson, 2004)

Ageing - The natural progression involved in getting older that is accompanied by physical, sensory and cognitive changes

Artefact - Refers to something made or shaped by man, in this case realised by designers such as products, vehicles, and furniture etc.

Artistry - The characteristics of workmanship, ability and artistic effect embedded within an outcome

Brief - A written document for a design project that focuses upon the desired results

Context - Users, equipment, tasks and the physical and social environments in which an artefact is used (British Standards Institution, 2010)

Design ethnography - Primary research methods that borrow from the methods of ethnography, which include a variety of data collection techniques; typically including approaches such as observation, questionnaires, and interviews

Designerly - A design focused approach that uses a synthesis of knowledge and skills from sciences, humanities and technology to approach often ill-defined problems in a solution-focused way (Cross, 1982)

Design insight - Acquired understanding that has relevance to design issues

Design process - The sequence of activities undertaken by a designer when developing a design artefact or service

Design thinking - Human-centred innovation method for innovation and enablement (Brown, 2008)

Empathy - the capacity to understand and be sensitive to the experiences of another

Humanistic - To be centered on human interests and/or values

Human-Centred Design - An approach originating in scientific fields (e.g. computer science) aiming to make systems usable and useful through focus upon human ergonomics and human factors

Human information - Mixed media information that conveys a combination of people-based information and empathy

Information - Communication of knowledge or intelligence gained through study, communication, research or instruction

Inspiration - An inspiring influence that has the capacity to effect thought

Insight - Comprehension of the inner nature or an underlying truth of a situation towards a deeper understanding

Interaction - The action resulting when a person uses an artefact or service to perform tasks

Older adult - People aged 65 years and over (World Health Organisation, 2011).

People-centred design – An iterative process of design that places understanding the needs and characteristics of the individual people being designed for at its core, considering physical, cognitive, social and emotional factors

People-centred thinking - A way of thinking that places the needs and characteristics of the people being considered at its core

Reflection - Focusing of thought for careful consideration towards converging thoughts or ideas

Representation - A portrayal of something that provides a representative impression

Retrieval - The opportunity for something to be retrieved or recovered

Reflexive - The process of a researcher reflecting on his or her position within research processes (Alvesson & Sköldberg, 2000)

Socio-cultural - The social and cultural experience of individuals

Textual data - Refers to data articulated textually, which includes written or printed in alphanumeric or diagrammatic material

Verbal data - Refers to data articulated verbally, which includes formal and informal communication in one-to-one and/or group discussions

Visual data - Refers to data articulated visually, which includes sketches, pictures, diagrams, renderings, illustrations, CAD models and physical prototypes

Chapter 1. Introduction: Information and empathy for people-centred design

'To understand is hard. Once one understands, action is easy.'

Dr Sun Yat Sen, 1866-1925

In a world of increasingly diverse populations and advancing technological opportunity, there is a need now more than ever for designers to design in ways that demonstrate sensitivity to the real world, and an understanding of real people and their real lives. Empathy is often highlighted as an important factor in understanding user need; however, in a competitive field where tight timescales and tighter budgets frequently drive the development process building this understanding is a critical challenge for designers; a challenge that requires support.

This thesis investigates the potential for 'supporting people-centred design through information and empathy', focusing upon the early stages of design development. This chapter introduces the main topics of the thesis in terms of the practice of people-centred design, and the themes of information and empathy; where information in relation to people is defined as gathered evidence, and empathy is defined as the ability to understand and share outlooks. There are extensive potential possibilities for combinations of these themes from inception to the realisation of designed outputs; this range of information and empathy combinations has been given a working definition of 'human information' for this thesis. A crucial component of human information that will be explored in this thesis is the empathy element, as the ability to empathise with end users is hypothesised as being key to designing people-centred products beyond purely functional considerations.

This chapter presents an overview of the thesis through the structure shown in Figure 1.1, providing introductory context for the themes of people-centred design and support resources setting up the key research question and sub-research questions a and b:

Key Research Question:

What is the current and potential role of human information in the design process, and how might this role be supported and enhanced?

a. What are the requirements of a resource to facilitate inclusion of human information in the design process?

b. What role does people-based data currently have in design development?

Introduction:	Background and research question
Context:	o People-centred design
	o Design Process
	o People-centred designers
	o Support resources
Aims and objectives:	Addressing research question
Thesis structure:	Overview of thesis chapters

Figure 1.1 - Format of Chapter 1

1.1 People-centred design

The world is abundant with artefacts of the design process, affecting those that interact with them every day of their lives. How effectively these artefacts integrate within the daily activities of individuals can vary immensely, and has much to do with how proficiently their needs have been considered, understood and acted upon by designers during the design process (Norman, 1990). As populations and societies become increasingly diverse, designed outputs based upon limited perspectives on increasingly unfamiliar people can be insufficient for designers (Zeisel, 1984). Information and empathy is hypothesised as key to understanding the lives of others; information to more plainly impact elements such as dimensional design considerations, and empathy endeavouring to understand on a more human level the day-to-day lives of those being designed for.

The decisions designers make are dependent upon their own knowledge, experience, education and the impact of others upon them, including colleagues, clients and end users (Lawson, 2005); what can be categorised as knowing in a 'designerly' way (Cross, 1982). Designers are faced with a significant challenge of connecting with users in ways that are more direct and less filtered (Lawson, 2005), accessing useful and informative human insights and, beyond this, effectively managing and utilising these insights to influence their processes in meaningful ways.

In their quest to create and innovate, designers have historically been wary of research and the associations it holds, with many perceiving research negatively, as a process that can stifle creativity, owing to the focus upon what has already been, instead of what is yet to come (Frayling, 1993). This perception coupled with commercial constraints (Sims, 2003; Dong, 2004) causing the too frequent focus upon the 'end-product' above 'end-user', has until relatively recently found the design process less explicitly attentive to the human element than one would expect (Crilly and Clarkson, 2006). Lack of focus upon this aspect has in turn left a gap in regard to capture and communication

of people-based design insights (Lawson, 2005). These insights can be a rich source of information which, if managed effectively, can be invaluable, as Tim Brown of IDEO states, a sensibility for matching needs with technological possibility as a key business strategy (Brown, 2008); designers need to use this alongside an empathic understanding of those they design for (McDonagh-Philp and Lebbon, 2000) to create effective design propositions.

Reliance upon tacit knowledge (Brusberg and McDonagh-Philp, 2002) coupled with a tendency to neglect to manage people-based design knowledge from project to project (Cardello, 2005), and at times within individual projects, is a missed opportunity. If the collection of human information during design development were to be more tangibly and consistently captured, ensuring it is accessible beyond the scope of a single project, it could assist further knowledge transfer and encourage reflection upon material from current and previous projects.

A deeper understanding of those for, and with which, designers intend to design is key to effective people-centred design, with the connection between the designer and end users having great potential to be enhanced if supported. As such, the intention of this thesis is to **research the potential of information and empathy support and use for designers within their processes, investigating what the current options and opinions with respect to end user related resources are**. From this position, this thesis is to suggest potential new resources that could support human-based information usage, and therefore increase designers' utilisation of information and empathy within their processes.

1.2 Design and research

This thesis will focus upon (but is not exclusive to) the industrial design process, where the output is predominantly in the realm of consumer products/artefacts. Industrial design can be described as a professional service based around the generation of concepts and specifications towards enhancing the function, appearance and value of products and systems for the benefit of users and manufacturers (IDSA, 2010).

Although industrial design requires a variety of tangible technical skills (such as computer aided design, material knowledge, etc.), the process also shares many of the qualities of artistry (Avital, 1992). Developing a design is a creative process, the culmination of an individual's/teams' skill, experience, strengths and tacit knowledge. Hence output is in many ways a unique response, often with signature elements typical of the designer's work (Lawson, 2005).

Design problems are often complex and 'wicked' (Rittel and Webber, 1973) and involve a range of diverse influences, many of which are prioritised under the judgement of the designer. During this process involving disparate and often conflicting elements, sometimes non-explicit criteria, such as user-based research, can prove difficult to manage or even include (Bruseberg and McDonagh-Philp, 2002). Effective people-based 'design research' is vital to good people-centred design (Formosa, 2009); however, with design research a relatively new addition to the discipline emerging in the 1960s (Cross, 2007), it is not as integrated as other factors in the commercial design process (Bruseberg and McDonagh-Philp, 2002), such as manufacture, material and aesthetic practice (Cagan and Vogel, 2002). The human element of such research has until recently received less emphasis than other design criteria (Norman, 2002; Formosa, 2009).

There are many models of the design process (Design Council, 2007). However, there is a predominantly common sequence in all of these models, which is simply represented by the 'double diamond' model (Figure 1.2) produced by the Design Council (Design Council, 2005) based on its analysis of numerous design

companies' processes, which gives an overview of the convergent and divergent stages typical in design development, from 'discovery' through to 'delivery'.

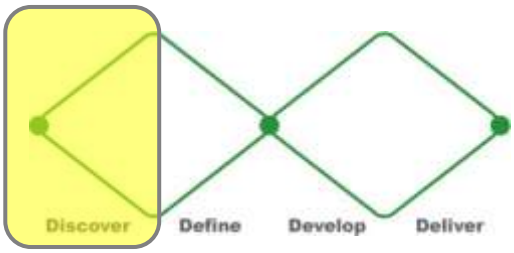


Figure 1.2 – 'Double Diamond' discovery phase (derived from Design Council, 2005)

Of particular interest to this study is the first divergent stage of discovery (as highlighted in Figure 1.2), where designers explore the terrain of their design problem through divergent consideration into the area and related design issues, ideas and influences. Within this phase the role of user-based information and empathy capture and usage is of particular interest to this research. It has been identified that designers seek to gain as much human inspiration as possible during this stage in the design process (Fulton Suri and Marsh, 2000). Indeed, the discovery phase is where initial ideas are formed, and where user needs begin to be identified though a combination of information such as market research, user research and trend research. These early exploratory phases are where key concepts are often formed that carry throughout the process (Darke, 1979). Clients can offer briefs and accompanying research, but the form these take is inconsistent (Lawson, 2005) and often lacks the required details (Bruseberg and McDonagh-Philp, 2000), causing designers to proceed with inaccurate (Marshall *et al.*, 2010) or incomplete knowledge (Crilly and Clarkson, 2006). What they proceed with can be based on their own existing knowledge (Norman, 2002; Cardoso *et al.*, 2005) or rapidly researched data and new interactions with users (Norman, 1999).

Limited briefs (Powell, 2006) can prove extremely problematic and can trigger early user research to be opportunistic (Restrepo, 2004), often involving colleagues or other readily available people (Hasdogan, 1996) considered

relatively representative to the intended user types (Crilly, 2005). This approach evokes little in the way of unaffected representative information or relevant empathy, and in being gathered so quickly can lack detail. Additionally, previous research has indicated user involvement frequently occurs too late in design development, providing little value for ideation (Don and Petrick, 2003).

It is posited that the earlier stages are where the greatest potential for broad user based information and empathy building can occur, while the design variables are being defined. Additionally, it is posited that supporting this phase could have great potential to enrich people-based considerations in the proceeding phases. Therefore, this research deems resources to support human information as important in helping create a richer and more textured (Fulton Suri and Gibbs Howard, 2006) representation of those being designed for, which can be used throughout the full design process.

1.3 User understanding

There is currently a drive for designers to be more conscientious of demonstrating a deeper understanding of user needs and how people live (Rajimakers, 2007) and to take this into consideration when designing in order to elevate the value of the designs they produce (Strickfaden, 2006), a notion that can be traced back to ideas from Participatory Design in architecture (Cross, 1982), which also included the concept of designing for more diverse groups.

There are a variety of factors that influence how designers understand those for whom they design, such as previous experiences, cultural references, their abilities to access and uncover knowledge through user research skills (e.g., design ethnography, etc.) (Formosa, 2009). This research focuses on the themes of information and empathy, and how designers can make use of these elements to better understand those being designed for.

Movements such as 'inclusive design', 'design for all' and 'universal design' have highlighted the advantages of considering diverse stakeholders and their abilities within design processes (Clarkson *et al.*, 2003). However, although they have highlighted the need for empathising with and understanding less-represented groups, the impact that these movements have made in professional design practice is limited (Dong, 2004).

1.3.1 Prior experience and background

Design projects frequently involve the redesign of existing artefacts and services, but also involve new problems, where designers will initially recall connected knowledge in order to explain, explore and understand. Initially this is based upon their previous experiences and ability to recall these experiences; beyond this it is down to the research skills and resources they employ on the project and their ability to recover relevant information (Schön, 1983).

Based upon the researcher's observations within professional design practice, typically upon receiving a brief designers will immediately begin to process the

problem, referring to their internal knowledge base about the world as they understand it and how this might relate to the brief they are being presented with. Designers can work within processes that are highly subjective and based on individual insight and experience (Heskett, 2002). As such, designers have to take care not to unwittingly design features that do not reflect the needs of those they are designing for.

Given that in the United Kingdom a typical designer is aged thirty-something, Caucasian and predominantly male (Design Council, 2010a), these ethnocentric approaches can result in limited understanding of important factors such as the needs, habits and cultural references of more diverse user groups. Under these conditions, the experiences of the designer regularly differ from those for whom they design, hence gaining insights into cultures and experiences of diverse groups can be invaluable in understanding users and evaluating designs (Ostroff, 2003).

A typical designer will draw upon their own knowledge, experiences (Norman, 1990; Cardoso *et al.*, 2005) and resources at their immediate disposal (e.g., hard-drive contents, internet, etc.) Next they might try and access the knowledge held within their environment (i.e., studio, bookshelves, company reports, etc.) through resources such as colleagues and previous project records/reports (Hasdogan, 1996). If this produces little yield, they will look outward consulting existing networks, eventually leaving their personal spheres altogether and attempting to enter the user domain, either directly or through representative bodies (Strickler, 1999). Accessing this domain can prove difficult (Dong *et al.*, 2005; Crilly and Clarkson, 2006), and hence is frequently omitted from the design process.

Consulting external users is often (incorrectly) judged as an inappropriate use of valuable time and somewhat outwith their remit by some designers (Warburton, 2003) or more frequently by their clients (Don and Petrick, 2003; Crilly and Clarkson, 2006) who can have markedly different sensibilities from the designers they utilise (Hsu *et al.*, 2000). This can lead to a fast

approximation of end users, at best well informed due to relevant previous experience and knowledge, at worst a superficial and inaccurate representation with little or no basis in genuine user insights. In order to accurately account for those being designed for, designers must ensure their knowledge is current and that they maintain representative impressions and detailed descriptive material.

It is logical to assume that every designer is influenced by previous experiences and background, and that this understanding will influence outlook, but it is crucial to include people beyond those that have been a part of one's personal experiences (Goodman *et al.*, 2007a). In the researcher's experience of commercial design practice, this begins by moving outwards to consider colleagues' experiences; then progressing to tap into external relationships; and finally shifting into new and unfamiliar user domains (this concept is illustrated in Figure 1.3), hence broadening one's knowledge relating to potential users and the details that apply to their lives in terms of details such as physical and cognitive characteristics.

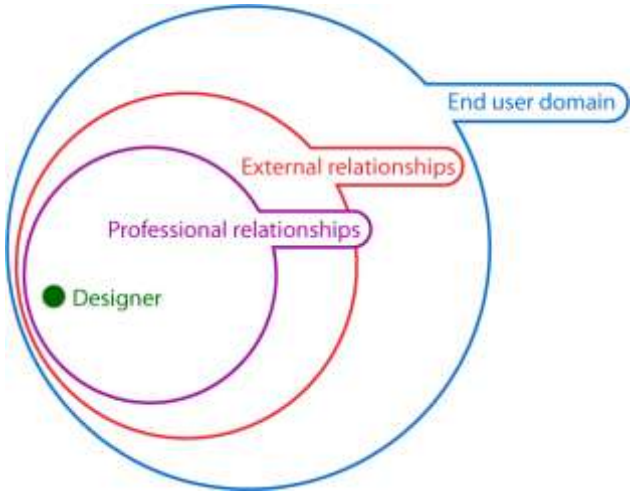


Figure 1.3 - Spheres of influence

1.3.2 Approaches to understanding users

Companies with proactive approaches towards understanding their users' needs benefit not only from better products, but also associated advantages such as profitability and customer loyalty (Topalian, 2005). Clearly the best way for designers to be confident that they know their end users is to interact with them within the context of their own domain, observing and questioning them. However, practicalities such as time constraints, ethics procedures, lack of experience, and lack of access can hinder this approach (Goodman *et al.*, 2007a). Information and empathy can be drawn from such user interactions, but without access it is difficult for designers to identify user needs with confidence, hence effective approaches need to be developed and adopted.

As a relatively new approach, people-centred design research has borrowed from and cross-fertilised with many methods from the social sciences, particularly those connected to anthropology (Clarke, 2010) with its qualitative, holistic, almost artisan qualities (Geertz, 2000). Design anthropology, which sees designers engaging in social research as part of their design process (Clarke, 2010), has emerged to look beyond form, function and the materiality of objects, towards unpicking complex interactions, social and cultural relevance and meanings between objects and people (Clarke, 2010). Within this, ethnography in particular has received a great deal of attention (Wasson, 2000) leading to the development of the term 'design ethnography' (Salvador *et al.*, 1999), which aligns well with a people-centred design philosophy, fully engaging with observational techniques and human focus.

This thesis will pay particular attention to the relatively recent prevalence of methods that can be broadly categorised as design anthropology (Clarke, 2010) the techniques of which, although often different from those found in classical anthropology and ethnography (i.e. the techniques often being adapted in various ways for more rapid design-relevant information capture (Norman, 1999), have a similar goal of understanding the everyday lives of people in their everyday settings – a vital characteristic of empathy building. The short

timescales of commercial design projects have resulted in design ethnography approaches that seek to rapidly identify, or even provoke issues of importance or relevance to the user, facilitating insight capture so that innovations are more in line with what users want (Brown, 2008). Currently adopted approaches to design require interpretation of complex consumer and social patterns, which form a large part of the research process (Clarke, 2010). The management and presentation of this research information, alongside the rapid nature of the capture poses many questions with respect to how these investigations might be supported.

1.3.3 Understanding diversity

With current demographic trends such as increasing ethnic diversity, multi-cultural societies and the ageing population (Goldstone *et al.*, 2012) it is vital that designers are able to appreciate and tap into a broad and ever changing variety of human capabilities, needs and wants (Griffin, 1996; Etchell and Yelding, 2004).

Inclusive design frequently focuses upon the 'old-young' and 'abled-disabled' dynamic. The philosophy of approaches such as inclusive design encourage outputs that benefit a wider range of end users through considering the needs of those that are often overlooked in the design process; often through including 'extreme users' (Dong *et al.*, 2005) in the design process, who typically have pronounced physical or cognitive limitations, both permanent (as in the case of the naturally-ageing body and the associated physiological limitations) or temporary (as in injuries or non-permanent physical conditions such as pregnancy). This model is a useful starting point in considering the possible diversity of end users, hence it should be considered part of people-centred design or more simply 'good' design practice that seeks to understand a range of relevant users. This thesis considers information and empathy resources as a means of achieving people-centred design, of which inclusive design is naturally considered to be part of.

This philosophy is not only morally sound but also has clear commercial benefits, an important consideration for businesses (Clarkson *et al.*, 2003), when one considers demographic changes which are being experienced across the world, particularly in relation to the increasing older population, due to reduced birth rates and increasing life expectancy. For example in the UK there are currently 10 million people over 65 years old, with this number expected to double to around 19 million by 2050 (Cracknell, 2010).

There is inherent value in considering diverse groups in design thinking; it gives depth of understanding, and adds to the knowledge that a designer holds in regard to people's needs and capabilities (as well as the variations in these) directly influencing their design input. It has been shown that considering 'extreme' users in the design process, particularly in the early exploratory and conceptual stages, can create very interesting and inspiring lateral thinking (Dong *et al.*, 2005; Fulton Suri and Marsh, 2000), and business opportunities (Morgan, 1999). However, a limitation perceived by designers in focusing predominantly upon the abilities of such 'extreme' groups is that it runs the risk of compromising their creativity (Bruseberg and McDonagh-Philp, 2002; Crilly and Clarkson, 2006). This point of view, though, neglects to realise that people all have a need for good design, and a well considered design is what everyone desires (Keates and Clarkson, 2004). Also there is a great deal of opportunity in considering design possibilities beyond the purely functional needs of these groups (such as their emotional, sensual, cultural, philosophical desires, etc.), as well as considering other potential diversity that might be relevant (e.g., race, ethnicity, wealth, etc.). Additionally, by designing with these groups in mind, the outcomes tend to include more people overall, whereas designing without these groups in mind means the outcomes tend to be more excluding overall (Coleman, 1999). In other words, designing with these users in mind is an effective way to include the broadest group of people reasonably possible (British Standards Institute., 2005).

1.4 Human information resources

Examples of human information can be found in an array of mixed resources and communication formats: from an engineering or scientific standpoint this might be anthropometrics charts; from a marketing perspective it might fall into trends and consumer behaviour reports; for a designer it can often encompass these and other sources, from the primary data designers might generate themselves (such as measurements, quotes, pictures, recordings, prototype testing results, etc.), to secondary data that they are often given with the initial brief or collect throughout development (such as, anthropometric data, academic papers, newspaper articles, case studies, etc.)

Within this assortment of resources there is potential to present richer stories that communicate important elements of user information and empathy through collating and utilising a variety of sources together, both conventional and unconventional, quantitative and qualitative, primary and secondary, to support a people-centred approach to design (IDEO, 2003).

The representation of design-relevant details of collected human information is a challenge not only in on-going projects, but also where previous projects may have yielded human information that has relevance beyond the scope of the single project from which it was generated. When gathering on-going information the effective communication of findings can prove problematic. When you consider that designers are predominantly visual thinkers (Strickfaden, 2006), clearly responses to different formats of stimuli will be markedly different. Related to this, trust in available materials can be a major concern (McDonagh, 2006), hence materials have to communicate in ways that are considered familiar enough to place trust in. Designers understand and tackle design briefs through distinct blends of expertise, approach and execution (Lawson, 2005). Equally designers take different approaches to data dependent on the project, with preferences and styles being highly individual. Proposed solutions aim to be effective answers to the brief and an embodiment of designers' own reflections on what has been identified as the relevant issues.

Similarly when collecting user insight, designers take a variety of approaches. With time constraints a concern (Sims, 2003; Dong, 2004), these are often rough and ready, planned and executed rapidly, to gain quick and varied insights used to inspire and inform during concept development (Lofthouse, 2001). However, the lack of consistency in format and data interpretation approaches can be problematic and have met some criticism in the design research community (Cross, 1996; Scrivener *et al.*, 2000).

Designers' skills and understanding are broadened in the professional realm through experience-based learning, with designers gaining more knowledge as they complete more projects (Lawson, 2005). This personal experience and knowledge, although limited, can be used during future design problems (Crilly and Clarkson, 2006). To supplement previous experiences, designers often engage with end users through experimental methods, such as interacting with prototypes and test rigs (Nickpour and Dong, 2009); however, user groups can be difficult to recruit and their use therefore limited (Bruseberg and McDonagh-Philp, 2002). A common issue in many design projects is the fact that this process can be difficult to set up without established access to specific user groups, and hence proves both time-consuming and expensive (Sims, 2003; Dong *et al.*, 2004).

1.4.1 Barriers to human information resources

Unfortunately, industry in the UK has been slow to adapt to such demographic changes and the practice of design approaches such as inclusive design (Dong, 2004). This was highlighted in a study by Sims (2003), where 29 UK based designers were consulted and confirmed that although the community was familiar with the issues and viewpoint of inclusive design it was not widely practised.

In their focus on the 'new' in aspiring to design innovative solutions (Frayling, 1993), designers are prone to neglect existing sources of useful information regarding products and peoples' experiences with these, preferring to generate new material (Nickpour and Dong, 2009). However, within design groups there

is potentially a wealth of experience and findings from previous projects, that if made more accessible, transparent, tangible and engaging could not only inform and inspire (Keller *et al.*, 2009), but could give designers a base from which to insightfully begin to further explore new projects based on unique human information collections. Interpretation will always vary from individual to individual, but if the foundations are well laid, the interpretation should be more valid to the design problem and the intended users (McGinley and Dong, 2011).

Although there is an abundance of books and data on ergonomics and anthropometrics (e.g. (Smith *et al.*, 2000; Pheasant, 2003; Diffrient *et al.*, 1982)), user based information gaps exist in the design process (Marshall *et al.*, 2010), and there is a clear reliance on intuition, previous experience and experiment over consulting existing resources (Nickpour and Dong, 2009). Equally designers can be critical of consumer research information and the designs that result influenced by such information (Schmitt and Simonson, 1997). It is the researcher's experience that there is a prevalence of designers utilizing prior knowledge unless the project is unique enough that they must engage with new scenarios, users and data. Existing ergonomic and anthropometric data is largely inflexible and difficult to access (Goodman *et al.*, 2007a); and even when appropriate to a design project, information will be considered undesirable unless in a format that appeals to designers, and can be easily located and accessed (Lofthouse, 2001; Goodman *et al.*, 2007b).

1.4.2 Potential for human information resources

Design studios are spaces where designers surround themselves with reference materials and the tools of their trade. Resources will vary and understanding of them can only be as detailed as the material at hand communicates; this is where it is key to have resources or human information in place to allow understanding of potential users. Visual representation and dialogue are the two fundamental forms of communicating in design (Strickfaden, 2006), unlike

most professions communication is not word-and-sentence based but instead image-and-sequence based (e.g., speech, illustration, visuals).

A variety of resources are heavily utilised in the design process particularly in sketching, detailing and model making both physically and virtually, which are traditionally fundamental skills of the design process. In this respect it is surprising that there is little in the way of existing tools to support human information use. User input throughout the design process is something to which meaningful support could be offered, but attempting to force-feed generic information for use in the design process can be considered detrimental to creativity by designers. It is therefore essential that any resources or tools offer optional support that can be tailored to the needs of the designer (Goodman *et al.*, 2007b). There is a desire for raw data; however, conflictingly, in a format that is condensed down to be design-relevant, allowing designers to quickly glean overarching themes, but to also allow depth for 'discovery' of project significant insights (McGinley and Dong, 2009). It is apparent that data on its own is not enough, it needs to be presented in such a way as to engage on a deeper level and evoke empathy. There is scope to make use of these forms of information by communicating them in more engaging ways, alongside additional empathy driven elements to create richer pictures, naturally building on the knowledge a designer already possesses, in a more human way. A major step is to communicate in a suitable, and 'designerly' data language (McGinley and Macredie, 2011), to allow information to add to the story of a design development in a natural way (Goodman *et al.*, 2007b).

The current range of platforms for mixed media use and communication are exceptional and increasingly accessible through new interface technologies (e.g., tablets, smartphones, etc.) and in particular on-line developments (e.g., Facebook, flickr, etc.) are demonstrating the abundance of possibilities for effectively capturing various formats of people-based information. Equally, such mediums are available to curate and communicate information in ways that could be valuable to designers.

Designers are sceptical of conventional consumer research and the results such information produces (Schmitt and Simonson, 1997) and are more likely to trust empirical research, hearing it from those they are designing for (Nickpour and Dong, 2008). Designers often feel mistrust towards data that has already been through a process of interpretation (Restrepo, 2004); therefore, there is a need to capture raw unprocessed detail and enhance the dry representations that exist in the likes of conventional anthropometric resources; bringing human information to life through presenting user insights as fuller stories, conveying liveliness through visual material, and giving scope for the design audience to complete the interpretations, allowing a level of co-ownership. In order to present more than just data when trying to convey the lives of real people, a variety of strategies and techniques need to be deployed in order to get closer to a truer understanding. It is proposed that these real people and real lives could be encapsulated and managed within resources aimed at the designers and relevant to the design process.

Exploring and explicitly articulating the outputs of people-centred methods and processes including the role of human information is a new challenge for designers (Evans, 1998), one which many find difficult and some are reluctant to engage in (Bruseberg and McDonagh-Philp, 2002). This may play some role in the lack of existing resources relating to human information management in commercial practice.

There are contradictory qualities within the design process being rational and cognitive, and yet also at times irrational, emotive, intuitive and non-cognitive (Buchanan, 1995); parallels can be drawn with the role and use of human information, where a conflict exists in the need to somehow manage human information, to capture and present important details; yet a desire exists to include humanistic, raw and inspirational qualities that make engaging with real people so powerful. This is where a balance between systematic collection and engaging representation of individual qualities and subjective experiences must be balanced. One route could be a framework for storing human information, where the contents could be at the subjective discretion of those collecting;

however, this should be flexible enough that it can reflect the characteristics of the designer/studio (Goodman *et al.*, 2007b), which will help maintain their individual style, in not only the manner of the data but also the later interpretation.

1.5 Aim and objectives

The overall aim of this research is to contribute towards understanding the ways in which the use of human information (i.e., people-based information + empathy) can be enhanced in the design process. To achieve this, the focus is upon how human information is currently used and perceived by designers, in order to understand and align with their design processes. The research engages with designers to explore ways in which human information can complement their human interactions, exploring the potential through tangible resources, which can better capture and communicate human information within their design developments.

The criteria of a human information resource will be examined within this thesis, with the aim to move towards resources that can assist people-centred development in ways that align with designers' needs and consider the needs of the wider population.

As noted in section 1.4, this thesis will explore the role and potential contribution that a combination of human information and empathy can make to the design process, with the focus being on the use of mixed media formats typically utilised by designers, and the contribution that they can make towards supporting the use of human information. Hence, the thesis will report a series of studies aimed at identifying designers' needs, and propose means of working with people-centred materials focusing on the combination of information and empathy. The findings from these studies will inform the development of a prototype resource to support the design process.

The objectives, which correspond to the chapter structure highlighted in the next section, are:

1. To uncover current habits and opinions, and understand what human information is currently used and useful to designers. (Chapters 2 and 4)
2. To investigate criteria of human information to allow designers to integrate human information into product development prior to development and at the early stage of development. (Chapter 5)
3. To develop a resource proposition, from initial concept tools and co-design workshops with designers, through to establishing the basis of an online resource. (Chapter 6)
4. To represent and evaluate the final online resource proposal that embodies findings from the previous chapters. (Chapter 7)

1.6 Thesis Structure

Following this introductory chapter, the remaining chapters will proceed as described in Figure 1.4.

Chapter 2 will present the literature analysis, which will give a holistic account of information and empathy in design, and set up the question being addressed in this thesis.

Chapter 3 will give an overview of the framework adopted to bring several studies together using the Design Research Methodology (DRM) towards the common goal of producing a resource to support information and empathy use in the design process.

Chapter 4 will address Objective 1; engaging with designers through probe studies and interviews that were conducted to understand designers' current practices in terms of human information.

Chapter 5 will address Objective 2; describing two participatory case studies, which explored designer's behaviour concerning human information delivery before and during the design development process.

Chapter 6 will address Objective 3; discussing the process of resource development from initial concept tools and co-design workshops, through to establishing the basis of an online resource.

Chapter 7 will address Objective 4; representing the final online resource proposal that embodied findings from the previous chapters and the process of evaluation undertaken.

Chapter 8 will discuss and conclude the thesis by presenting the outcomes of the research, contributions to the field, and identifying opportunities for further work.

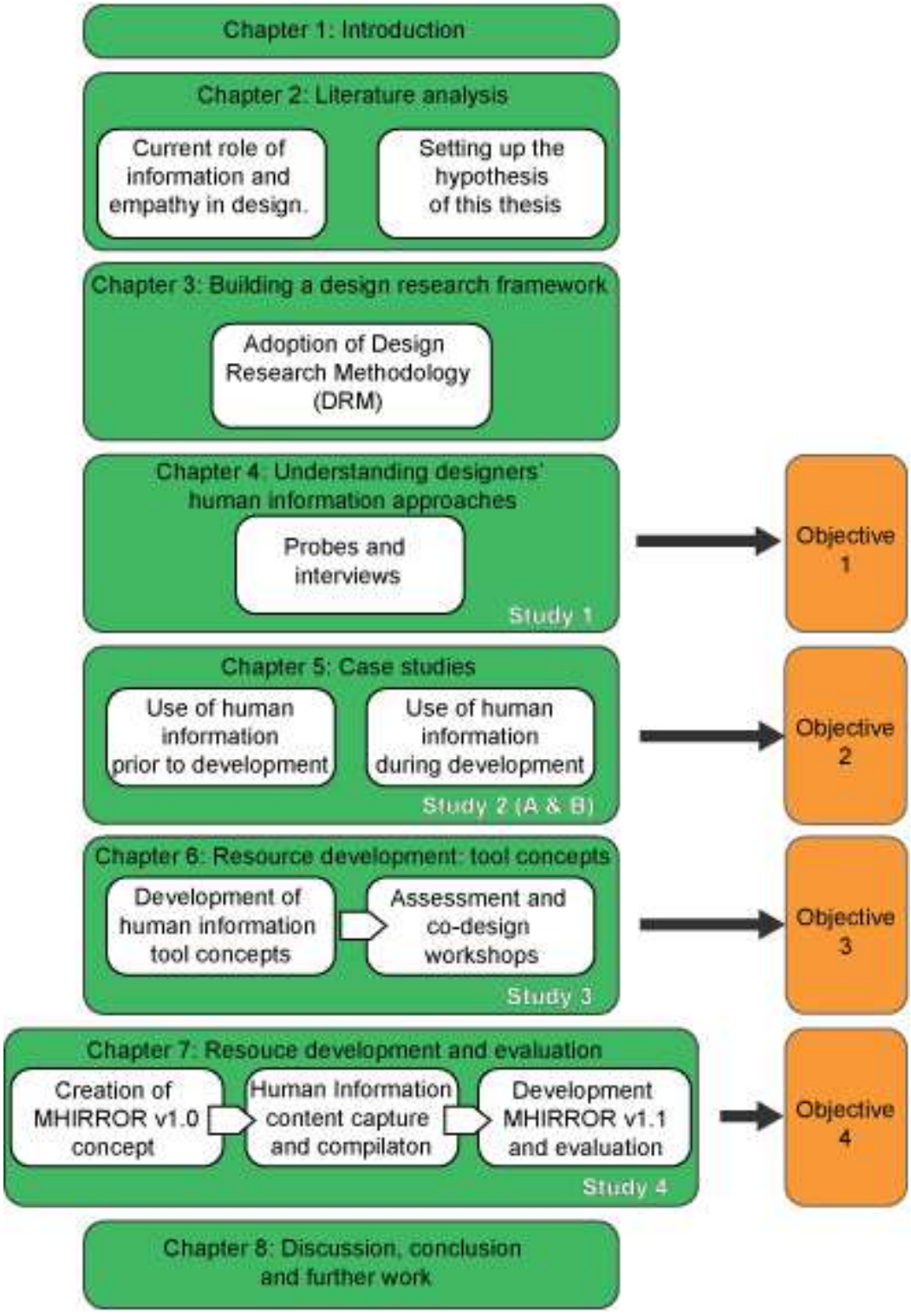


Figure 1.4 – Framework of thesis in relation to objectives

Chapter 2 Literature Analysis: Human-information support in the design process

This thesis examines the suggestion that supporting designers in their use of and reflection upon people-based information that is rich and textured (Fulton Suri, 2003) could assist in the design of more people-centred outputs. It is posited that key to this suggestion is the assimilation of human information, which is considered to be the combination of information and empathy in regard to diverse end users. Towards this goal resources that support this assimilation are a focus of the research.

In suggesting support based around human information to assist design, one has to first consider established design processes, and how designers typically go about understanding those they intend to design for. Through exploring these factors one is better positioned to suggest where potential for enhancement exists within contemporary design processes, and how resources might be incorporated in a manner that correspond with designers' needs. Towards understanding these factors the first section of this chapter will focus upon the design process, with a focus on the role of users within this.

Designers will typically consult a variety of sources to understand the necessary criteria of the problem. In relation to end user criteria, sources typically involve a combination of known or readily available sources (Goodman *et al.*, 2007). This analysis will consider conventional information formats used in design development (e.g. anthropometrics etc.) but also the less conventional (e.g. various qualitative data), the purpose being to examine existing and emerging uses and combinations of human information. The focus will be upon design but other disciplines will be included within the analysis, as the ability to make connections and blend skills of arts and humanities, sciences and technology are increasingly being highlighted as crucial design skills (Rochfort, 2002). Accordingly methods relating to design ethnography will also be touched upon, which have been rising in favour in the design community over the last 20 years (Bezaitis and Robinson, 2010). The integration of such methods in design

practice is evident with the emergence of Masters' degrees based around design and ethnography (e.g. the MSc offered at University of Dundee and University College London), and recent books such as Design Anthropology (Clarke, 2010) and Doing Design Ethnography (Crabtree *et al.*, 2012).

Finally, going beyond conventional data sources, the analysis will introduce the theme of empathy, which is key to understanding other people's mind-sets (Stueber, 2006). Empathy building is an indispensible skill for designers (Leonard and Rayport, 1997; Sleeswijk Visser *et al.*, 2007), yet remains somewhat of a dark art.

The effective use of human information is hypothesised as a route towards people-centred design, enhancing empathy through establishing an informed understanding of others situations and perspectives from which action can then be taken.

This literature analysis will go someway towards positioning the research question of this thesis, which asks -

What is the current and potential role of human information in the design process, and how might this role be supported and enhanced?

Hence the analysis takes a sequential path examining this question. It will begin with the design process and the phases that make up a design development, examining how design thinking demands people-based information support. Next it will discuss information available to designers, before addressing the role of empathy (as a key component of human information) in design practice and the role resources could play in supporting this. This analysis will help identify the exploratory directions required to further evidence the research question, which will be presented through the work detailed in the proceeding chapters.

2.1 Design process

It is important to have an understanding of existing design approaches to appreciate how these impact human information considerations, and to identify how best to work within the practical constraints design development commands.

2.1.1 Process Models

There has been extensive work carried out by design methodologists to map the design process since the 1960s leading to a broad and widely used collection of methods and processes (Dubberly, 2004); hence, a multitude of models exist across various branches of the design discipline, from engineering to architecture. They generally consist of similar linear, iterative processes of analysis, synthesis and evaluation (Ulrich and Eppinger, 1995). However, these routes suggested by methodologists are not necessarily the reality of practice undertaken by designers, which tends to be less rigidly structured (Lawson, 2005). Hence, these routes are not considered prescriptive, as design problems within practice are more complex and variable, with much overlapping of phases.

In any successful design journey, critical constituent parts must be brought into place (e.g. a brief assembled; issues investigated; concept(s) produced and tested against appropriate criteria; design realised and communicated) (Powell, 2006); however, rather than a linear sequence of separate events the process can more realistically be considered as an interdependent whole (Figure 2.1), made up of several segments where synthesis, analysis and evaluation sit between the negotiation of the problem and the solution; within this there is potential for human information to take a role throughout the process. This model aligns with the researcher's view on the design process as complex, overlapping, and sometimes unpredictable.

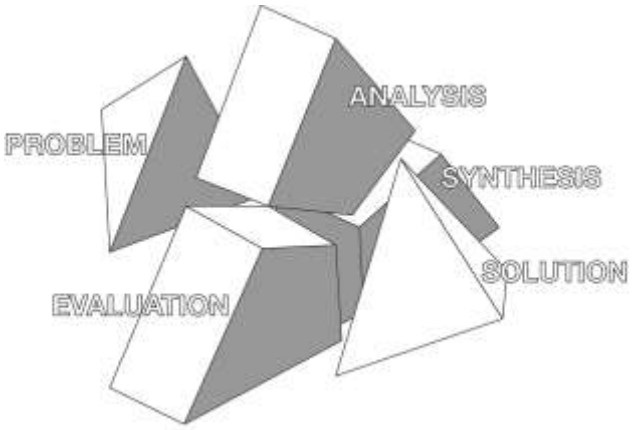


Figure 2.1 - The design process as interdependent whole (Adapted from (Lawson, 2005))

2.1.2 Data input during the design process

Design is concerned with problem identification and solving (Oak, 2001). Through being aware of the options and constraints, a process of evaluating the problem and proceeding with elements considered important can be achieved; however, with no singular solution design problems can be considered 'wicked' (Rittel and Webber, 1973; Cross, 1982), solutions gradually forming through continuous subjective judgement and critical thought, based around the knowledge that is built as the problem is worked through. This multi-faceted problem solving process within design uses a descriptive approach (Valkenburg, 2000), with both internal and external information collections, (which can include human information) being referenced towards a unique solution. These information collections grow with every new development initiated, and have to be accessible (Cardello, 2005) and manageable (Crilly and Clarkson, 2006), to ensure effective utilisation by designers; suggesting the need for a system to be in place that delivers on a number of characteristics such as availability, transparency and ease of use ((e.g. time-saving, suitable mental effort demands, convenient format and physical proximity) as stated by (Fidel and Green, 2004)). Such a system should accommodate efficiently and in a way that fits within designers work approaches, the wide variety of formats of human information they utilise in their process.

A revealing study (Darke, 1979) described the approach taken by architects facing complex problems. With a multitude of variables to consider she found that the architects tended to choose an uncomplicated idea (or 'primary generator' as she called it) early in the design process; this provided the designers with something tangible to work around, through reducing the possible number of solutions and hence allowing a simple idea to be built upon and examined more thoroughly. Of particular interest is how primary generators impact the full development, demonstrating how early in a designer's process crucial decisions can be made, and should therefore be supported with a sufficient level of information (in the context of this research - human information) to ensure carry-through and that the most optimal decision(s) can be made, considering key variables.

For clarity and to aid discussion towards signposting the approximate phases within the iterative process, this thesis considers the 'double diamond' model (Figure 2.2) produced by the Design Council UK (Design Council, 2005) to be a 'typical' design process. Within this model information need occurs in varying ways and to varying levels through the course of a design project, dependant upon many factors from project to personal preference. Human information input typically follows the model in that generally the information needs peak and trough in line with the divergent and convergent phases of the process, as priorities in the development change.

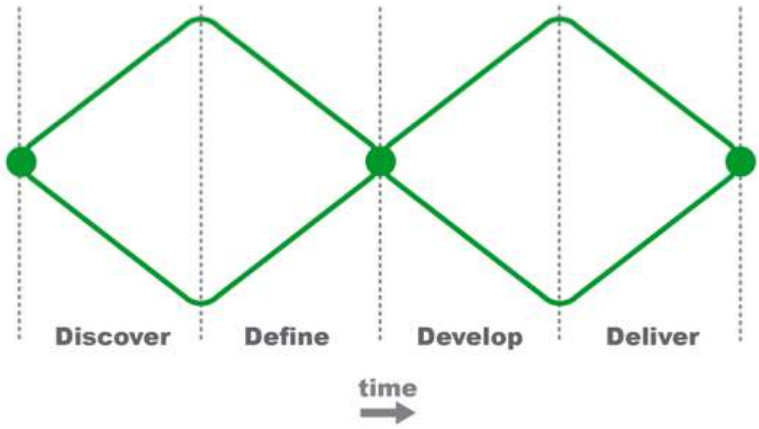


Figure 2.2 - Double Diamond design process model

(Adapted from (Design Council, 2006))

Typically within this model user data needs commonly begin high and continue at this level through the exploratory 'discover' phase as the brief is being broadly investigated; data needs become more specific through the 'define' phase, as a better understanding of detail is sought, refinement occurs and the required volume of data reduces. During the 'develop' phase concepts are further worked into prototypes which require testing, hence user data again peaks for interrogation and evaluation of proposed solutions against user requirements, before the 'deliver' phase, at which point all user data should be in place and integrated into the solution (McGinley and Dong, 2009). This process illustrates the importance of offering human information support for the design process throughout its phases, an approach suitable to development processes that are typically unpredictable and can go through several iterative loops of refinement towards a final solution. In order for this model to work in an optimal way human information has to be on hand from the offset, and newly generated information has to be readily visible and integrated into the process as the development proceeds; hence availability and efficacy are vital components (Loudon, 2009).

Human information provision can make up a powerful resource in the development of innovative design; however, amassing data indiscriminately is inappropriate and can seriously compromise the efficiency of the design process (Lofthouse, 2006); accordingly designers are understandably resistant to the prospect of filtering through masses of data without the guarantee of uncovering information of value. For people-based inspiration and reflection, designer's need human information to be accessible and relevant (Crilly and Clarkson, 2006; Goodman *et al.*, 2007b; Nickpour and Dong, 2009) with the option of digging deeper (if necessary) into the data to learn more about the person(s) represented by it, and how this might impact their development (McGinley and Dong, 2009).

This cyclical process requires opportunities to refer back to findings and clarify decisions and inputs, supporting knowledge and source sharing through effective communication within design and research teams (Bezaitis and

Robinson, 2010). The gaps that can exist between users and designers and users and clients, are illustrated (Figure 2.3) through a model called the 'knowledge loop' ((Keates and Clarkson, 2003)). The suggestion within this loop is that through knowing the user and representing them appropriately in order to provide usable data for designers, inclusive design can be achieved and as these designs are taken up by end-users the process can repeat; the looping journey allowing continuous and evolving user understanding and inclusion in design reasoning.

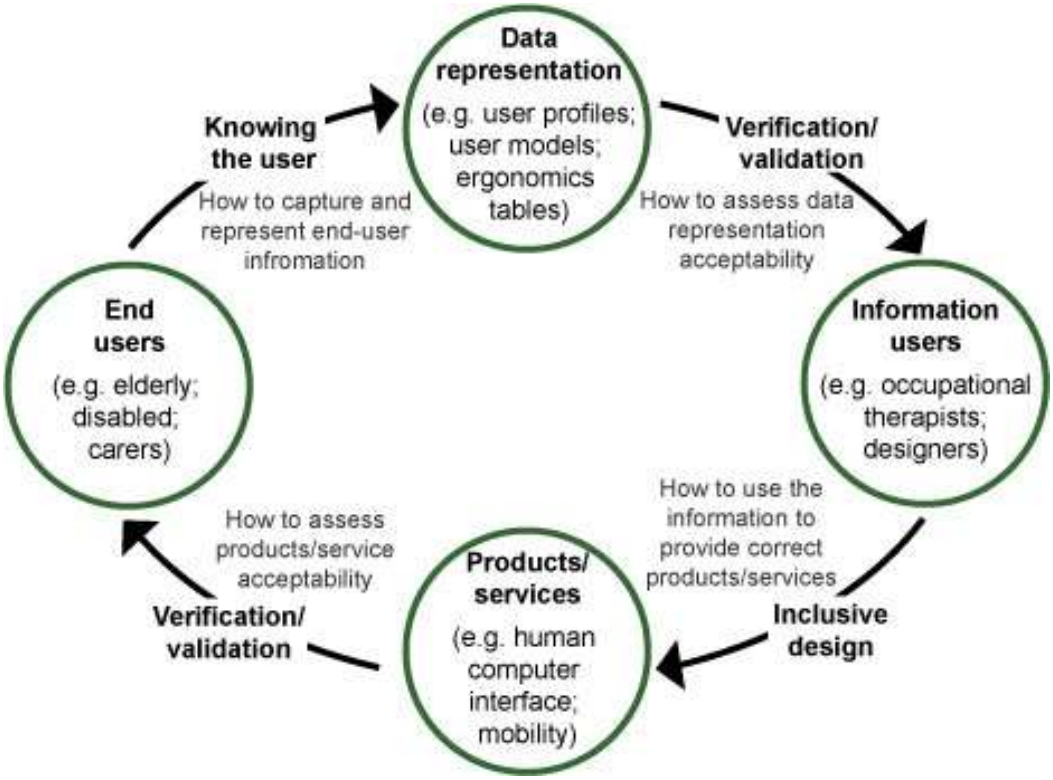


Figure 2.3 - Inclusive Design Knowledge Loop (Adapted from Keates and Clarkson (2003))

This model is dependent upon how the information is represented and retrieved for use in design. According to Keates and Clarkson transferring end-user information to designers means capturing needs and wants through both qualitative and quantitative methods and representing findings in ways that meet designer's needs. A major challenge is equipping designers with the skills to know how to retrieve, represent, organise, and use such information.

2.1.3 Design knowledge

The term ‘references’ was used in a design study (Goldschmidt and Weil, 1998) to describe the precedents that designers reveal to have inspired them. Although buildings and the varied constituent related parts were the subject of her study, the notion is an interesting one, particularly if considered in relation to human information. She explains that this dynamic collection of references must carry meaning, be intimately known to the designer or design group, and must relate to their current design agenda to have real value, if these criteria are met then the references are invaluable in design reasoning, as known and proven arguments. These references make up the body of dynamic influencers used in design development, part existing knowledge part on-going project-specific information collection.

In order to create design knowledge (Durling and Friedman, 2000) it is necessary to consider the kinds of information involved in design, the sources of information and how to make them useful for design practice. Throughout the design process, and particularly in the early more exploratory phases, designers seek data relating to the design they are undertaking, to build upon their existing understanding of the problem and subject area (Fulton Suri and Marsh, 2000). Data are considered materials that represent, describe or record states (Ahmed, 2000) both quantitative and qualitative, the formats of which can range from numeric measurements to video footage. Information can be considered data that has been processed or given structure, such as context, towards generating meaning (Mingers, 1995). In order to advance designer engagement with people-based data context is crucial, elevating it to useful human information to support design output through greater people-based understanding.

2.1.4 Reflection in design practice

Design is a dynamic process that the designer has to engage in and reflect upon (Alexander, 1974). Within professional design practice with strict deadlines, limited resources and often multiple projects running concurrently, there is little opportunity to systematically record people-based findings at any length and less opportunity for in-depth reflection. Reflection is considered of lesser importance to subject knowledge and practical skills in the commercial environment and hence tends to be neglected (Shadbolt and Milton, 1999). However, supporting reflective practice (Schön, 1983) is invaluable in helping make sense of the decision routes of design projects; and providing time and space to explore and reflect (Fulton Suri, 2011) is a key component of progressive design. Reflection acts as a way to further utilise information gathered and allows time to best communicate it amongst parties involved, to build experience into usable knowledge for future work. This does not mean mechanical recording of detail, but instead more effectively engaging with the material (Durling and Friedman, 2000). Designers continuously learn on the job, this process of experience-based learning equips them with the know-how required to tackle future problems, as they draw parallels from previous experiences. Through emphasising the need for reflection upon their process, decisions made and lessons learned, designers can more purposely identify the human information that had resonance within a project, organising the knowledge gained on the route to their solution (Johnson and Carruthers, 2006). Typically this reflexive learning process is left poorly represented and communicated, at best edited in a manner that delivers a distinct message to a particular intended audience specific to the project (e.g. client, journalist, public etc.). Frequently these formats contain limited information for other interested parties (e.g. designers and related disciplines) looking to retrieve and understand the process and learning's or to allow insight enough to influence future design decisions. Communication is an essential tool in design, from conveying ideas early in the process to articulation of concepts during pitches or presentations to gain client approval, but this skill is also needed to allow

effective future retrieval of people-based data (Bezaitis and Robinson, 2010). Beyond concept-related communication within design development there is a further need to communicate supporting data internally, to make tacit knowledge more explicit, in order to allow more than those directly involved in projects, access and understanding of the human based insights (Postma *et al.*, 2012).

Research on reflective approaches to knowledge has been dealt with at length in Schön's 'Reflective Practitioner' (Schön, 1983). He coined the phrase 'reflection-in-action', which describes the cyclical process in which a designer reflects upon their current situation in order to help them decide how best to proceed within the overall process, repeating this until the design is finalised. Two of the main forms of reflection detailed by are 'reflection-in-action' and 'reflection-on-action'. Reflection-in-action is happening as we are dealing with a situation, and our actions can still make a difference to the outcome, whereas reflection-on-action is post-situation, where the outcome is already established but there is potential to reflect upon it and consider how things were done and how this impacted upon the outcomes. It is hypothesised that in applying these principles to human information resources, the tangible capture of the people-based details during reflection-in-action as it happens could not only assist the development process but also have further application to support later reflection-on-action and influence future thinking and projects.

2.2 People-based information

The researcher would like to highlight at this point that he acknowledges that people-based information is a constituent part of the overall information needs pertaining to a variety of factors of a design process, and that there are many others (e.g. materials, processes etc.) of importance to successful realisation of design solutions (Pugh, 1991). However, this thesis concentrates upon human information, whilst acknowledging the various information needs of a designer and in this respect notes that exhaustive accumulation of data of any single variety within design would be misplaced, many consider the act of filling one's mind with facts to be detrimental to the creative process (De Bono, 1968). Being dexterous in thinking and utilising knowledge in innovative combinations not as stand-alone fragments is more in line with the needs of the designer (Fulton Suri, 2011), with flexible and broad human information provision being part of these needs. The sources of such information and their place in the design process will now be discussed.

2.2.1 Organising information within design thinking

An empirical study by Lawson (2005) highlighted two distinct ways of thinking adopted by scientists and architects; scientists were identified as more likely to use a problem-focused strategy, whereas architects used a solution-focused strategy. In order that the results of these solution-focused approaches are human-centred, good human information has to naturally form part of the deliberation from the offset, and not be squeezed in as an after-thought once the main principles of the solution are already in place. However, taking this a step further to meet with a common view, which likens designers to the classic image of the artist is misleading (Rochfort, 2002), as the notion of either delivering a unique manifestation of self-expression without any sociological consideration is an out-dated proposition (McGuirk, 2010). Designers by necessity have to look beyond established viewpoints and touch upon many different disciplines (Mulgan *et al.*, 2010). To illustrate this, if one considers a designer's understanding of aesthetic experience and visual appeal, it is likely to

share some qualities with that of the artists' outlook due to similarities in the visual education and training received. Beyond visual appeal designers must understand further human needs (e.g. physical, psychological and sociological needs) in addition to other key understandings of design, such as materials, manufacture and technology, all of which are essential in the creation of successful new products (Pugh, 1991). Typically designers will adopt information from other disciplines, but if the information requires specific expertise to translate or knowledge requirements are substantial they will consult experts of that particular field (Kotro and Pantzar, 2002) or look elsewhere (Marshall, 2010). Hence, communication with others during the development process is frequently an essential skill of the modern designer as innovative design output is not that of an individual but a team (Barnard, 1998). The designer has to be outward looking and consider problems holistically, including the full range of information generated by a range of stakeholders involved from client to end-user, and all those that fall between. Design decisions can be made in a variety of ways, such as imaginative thinking where a potential scenario or object might be thought through grounded in existing constraints; or reasoning where directed thought is used to work through problems, a form of 'reflective thought' (Lawson, 2005). Within each of these there is a need to understand constraints as well as needs, which requires information resources to assist in identifying and considering relevant detail, to go beyond what currently exists. Understanding these issues requires access to information and knowledge about those being designed for to encourage people-centred design (Norman, 1990).

Designers depend highly upon intuition and tacit knowledge, which can make tracing their decision processes difficult; however, contributing factors to this internalised process are not intangible, according to (Markus, 1969) there are four basic sources of information which contribute to design decision-making: the designer's own experience, others' experience, existing research and new research - all of which have potential to be better captured. Knowledge can be considered to be either tacit or explicit (Polanyi, 1966). Tacit knowledge in

design is the implicit knowledge used during design development that is often difficult-to-describe, being a combination of past experiences, judgement, intuition and prior knowledge (Goffin and Koners, 2011). Explicit knowledge on the other hand is readily communicated through means of words, pictures and diagrams etc. (Vincenti, 1990). In complimentary studies on thinking (Bartlett, 1958) and remembering (Bartlett, 1932) Bartlett proposed the concept of the internalised mental image or 'schema', which represents organisation of past experiences which are used to structure and interpret future events. The resources used to support this knowledge are all-important, beyond the mind of the designer external resources could contribute to the effective manipulation and re-use of much of this information. There appears to be great potential to develop resources for collection and manipulation of explicit human information within projects, allowing understanding and knowledge built within projects to move beyond the internal those directly involved in design development projects.

2.2.2 Understanding and authorship

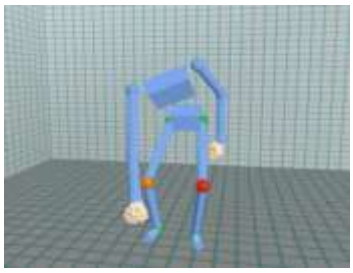
Understanding of people is increasingly vital to design (Formosa, 2009), not only to distinguish oneself from the growing global competition, but also to tap into what are large and lucrative markets (Bichard and Gheerawo, 2010). The incorporation of human information relating to these groups is key to offering appropriate and progressive design proposals. A key consideration for potential human information resources is that information does not in itself contain meaning, but instead triggers meaning (Mingers, 1995); meaning being formulated and retained from information, based on interpretation. Therefore there is a potential for individuals to take different meaning from the same information and adapt it to their process. This will be a key notion for any human information resource suggestion for designers, as the unique way in which they retrieve, represent, organise and reflect upon the various influencers within design thinking is essential to their process, and needs to be supported, not dictated, in order to maintain authorship of connections and deductions (Fulton Suri, 2011), and to crystallise innovative responses that

reframe issues through unique interpretation of the resources brought into mix (Walters and Gardner, 1988). Designers often feel mistrust towards data that has already been through a process of interpretation (Restrepo, 2004), preferring to gather their own primary data through exploration. Being engaged with and retaining some level of authorship of the information used in the design process enhances designers' trust of the material (McGinley and Dong, 2011). Typically designers' skills and knowledge in the professional realm are developed from experience-based learning, building an internalised knowledge base of past developments and user responses in relation to them, add to this effective and communicative resources and the possibilities have great potential to result in effective considered design.

2.2.3 Available information sources

Product designers want to have as much human factors inspiration as possible in the conceptual design phase of a project (Fulton Suri and Marsh, 2000); however, Strickfaden (2006) reports that there is no current software that effectively supports the industrial designer with inspirational materials in this phase. In recent years, a variety of new user data tools have been developed within the academic setting to support inclusive design approaches that could be considered relevant to this study as they move beyond simply re-appropriating anthropometric datasets as is the case with established tools such as Peoplesize (Peoplesize, 1998). These tools are considered to be of particular interest to this thesis in that they attempt to communicate more than just pure anthropometrics and have more innovative approaches towards communication than older more established tools. Those considered relevant to this study are: the web resource 'designingwithpeople.org' developed in The Royal College of Art (Lee, 2006); the 'Inclusive Design Toolkit' developed by the Cambridge Engineering Design Centre (Clarkson *et al.*, 2007); the biomechanical data visualizations produced for the Envisage project at Glasgow School of Art (Macdonald *et al.*, 2009); and the human modelling tools HADRIAN developed at Loughborough University (Marshall *et al.*, 2003). Descriptions of each follow (Table 2.1) –

Table 2.1 – Alternative user data tools in development

Tool	Description	Audience
Designingwithpeople.org 	Offers a broad range of introductory information on inclusive design practice. The website contains five sections: people; activities; methods; ethics; and methods lab. The 'people' section includes several personas with different abilities and some personal details.	General public and student designers.
Envisage project 	Visualisations of dynamic movement data, generated for use by professionals and users, as a means to communicate, understand and discuss mobility issues.	Professional designers and healthcare professionals. Users.
Inclusive design toolkit 	Offers a broad range of introductory information on inclusive design practice. A component within this resource is the exclusion calculator, which is useful for understanding how user capabilities can influence interaction with designed objects.	General public and student designers.
HADRIAN 	A software tool that allows virtual task analysis through CAD representations of 100 individuals measurements, through broad anthropometric and capabilities database.	Designers and planners

These data tools all adopt separate and relatively non-conventional data (Dong *et al.*, 2009); all take a more scientific approach where empathy is not a major criterion, and the data language could be considered scientific/academic rather than 'designerly'. However, although of interest to this research these tools have an apparent disconnect with industry and minimal uptake has been observed at this level (Zitkus *et al*., 2012), despite potentially offering support that could assist designers in connecting with users. The designingwithpeople.org website is intended as a broad introduction to inclusive design, with only one section describing people in the form of personas; the Envisage project dealt in CAD visualisations of specific movements, however, its development as a general design resource is not an intended outcome; the Inclusive Design Toolkit also acts as a broad introduction to inclusive design and contains five personas, it is considered more interesting to student designers than professionals (Dong *et al.*, 2013); Hadrian is CAD based software focusing on physical capabilities with some later updates attempting to add some pictorial and lifestyle data, but it is limited by access issues (i.e. is not web-based nor freely available and specific skills are required to use it effectively).

There is opportunity for a tool that moves beyond the broad and introductory level, the constraints of CAD systems or the manufacture of personas, particularly in relation to more empathy-driven considerations. Currently available tools, although valuable, are missing a component that focuses upon the textured characteristics of people in natural settings. Hence, there is scope for a tool that incorporates the forms of human information addressed in this thesis; more commonly associated with social science approaches such as ethnographic material, to richly communicate individuals in context; their life and lifestyle, supported by quantitative and qualitative data associated with those individuals.

Academic approaches can often have long timescales for projects, which is less common in commercial design development; connected to this academic

propositions at times do not align with designers' needs, being dissimilar in output style, accessibility and timescale (Goodman-Deane *et al.*, 2010).

Frequently designers have to rely upon diverse secondary data sources; although the usefulness of such resources is questionable, and designers often treat such sources with suspicion (Sims, 2003), and dimensional data, such as ergonomics and anthropometrics in particular are considered restrictive by innovative designers (Nicolle and Abascal, 2001). Designers would prefer visually engaging and relevant means of data presentation, above what they regard as 'scientific' data (Lofthouse, 2006); the former being considered more suitable for analysis of what already exists to, for example, refine dimensional choices once a design is in place in order to achieve the required specifications. These sources lack in other design relevant qualities (McDonagh, 2006); and can therefore often be of little value to designers as they seek information to inform synthesis (Lawson, 2005).

Once designers have project specific information in place they can begin to analyse the situation from an informed vantage point and begin to create concepts in response to the problem. However, it is difficult to know exactly what problems and information are most relevant until concepts begin to be developed (Fulton Suri, 2011), through these developments the problem is unpicked, and understanding becomes more coherent (Lawson, 2005). Hence, designers' approaches to new projects are often 'action-based' (Lawson, 2005), moving as quickly as possible into realisation of concepts, thinking and experimenting through sketching and making. This iterative process is dynamic, responding to factors of the design problem as they become apparent, searching for specific information as it is required, and adapting concepts to meet the evolving requirements. To this end information has to be gathered, manipulated and integrated into the design process. This information can take many forms.

2.2.4 Design brief and client-provided data

Alongside discussions with the client, a design brief can contain important initial people-based information for designers beginning a new project (Pugh, 1991). However, design briefs are often delivered in a compact manner with little consistency between the content and format across different projects, particularly if dealing with different clients (Goodman-Deane *et al.*, 2010). It is frequently a dynamic document, provided as a loosely defined goal (Archer, 1984), which then becomes a negotiation between the client and the designer (Powell, 2006) to reach consensus. Designers often use their skills and insights to modify briefs in a way that they believe will best benefit the client and targeted user, in this case it becomes a matter of on-going refinement as the reconciliation between what is possible and what is desired becomes more apparent (Darke, 1979). The briefing material provided by the client can also vary in quantity and quality (McGinley and Dong, 2009), and rarely is it inspiring or communicated in a 'designerly' (Cross, 1982) way. Unfortunately if time-strapped, designers often rely on the representation of end users provided within the briefing and accompanying documents, which have typically been reduced to an 'abstract consumer' (Desmet *et al.*, 2001) and hence can be limited and potentially misleading.

Similar to briefing documentation, any accompanying client data can vary immensely, from excessive amounts of information to nothing more than a single sentence brief and accompanying image (McGinley and Dong, 2011). The available data is of course influenced by the object, for example in the case of medical devices there is a great deal of existing legislation and standards which would be required to be complied with (Cifter, 2011), and in such a case the designer would also be directed towards related (though often difficult to access and interpret) research or expert knowledge (Cifter, 2011). Where the designers/companies are established in their field, trust is often placed upon reputation, skill and knowledge that a suitable design will be delivered typical of a 'house style' (Lawson, 2005).

2.2.5 Ergonomics and anthropometrics sources

Detailed standardised measurements of human bodies have existed for around a century and a half (Kroemer, 2005). Hence existing information resources such as anthropometrics data are widely available. Safety and fit with end users is traditionally the domain of ergonomics and anthropometrics with which designers are well acquainted (Kroemer and Grandjean, 1997); however, advances in materials and technology and new ways in which people interact with designed artefacts, spaces and services as well as the prevalence of interdisciplinary collaboration such as those among designers and ergonomists (Clarke, 2011) mean that design outputs should do more than just 'fit' the intended 'typical' user.

Ergonomics and anthropometrics are well-established within design and can have a significant role in development, particularly in relation to specialties such as workspace design from which the discipline originates, but it is critical that designers are provided with more than just anthropometrics upon which to base their design decisions. Currently the use of anthropometric data sources by designers is noted as limited (Nickpour and Dong, 2009). Although the well-established domain of anthropometrics can provide some useful user data (e.g. physical characteristics and abilities of people), problems do exist in available datasets in that few databases contain detail about older or disabled people; the data is often out-dated; and lack of standard measuring approaches can lead to confusing data (Sharma, 2008). Experienced designers tend to rely largely on experimental methods such as physical prototyping and engagement with people (Nickpour and Dong, 2008). Additionally, the vast majority of existing ergonomics knowledge helps to define the requirements for what is considered the 20 to 50 years of age working population of North America, Europe, Australia, New Zealand and Japan (Kroemer, 2005). This clearly does not align with global demographic shifts such as increasing ethnic diversity, multi-cultural societies and the ageing population.

Amongst further drawbacks of anthropometrics data is the frequent 'scientific' format that tends to invoke feelings of artificialness (Marshall, 2010), again this is in opposition to the driving principles of this research; which intends to suggest routes towards understanding through information and empathy with a focus upon real people, real opinions, real aspirations, real needs and creative understanding. It is the stance of the researcher that these are the factors that designers should strive to understand, and not approaches that seek to label and box people with generalised data. Designers' preference for experimental approaches to obtain human information (Nickpour and Dong, 2011) demonstrates that going beyond data is very much natural to designers, and that connection with real people invokes greater trust in the information obtained (McDonagh, 2006).

2.2.6 Marketing science sources

Marketing science has become established in the design process (Bezaitis and Robinson, 2010). However, limitations are found with marketing science-based approaches, which are typical of well-established and refined markets such as the automotive industry. Within these industries desired design outputs tend to be established in a reductive way based upon incremental improvements of well-understood variables (Leonard and Davenport, 1997). Marketing data (e.g. Mintel reports etc.) can give useful overviews of markets, and analysis of statistic based trends; however, designers complain that marketing data gives them no inspiration or feeling for the user's situation and experience (Kouprie and Sleeswijk Visser, 2009). This could be due to market research summarising and generalising to assist in establishing average target profiles of consumers. Unfortunately this clearly leads to a loss of important design relevant information that could provide individual-based insight and inspiration. Martin Bontoft, during an internal presentation (Bontoft, 2004) at the Helen Hamlyn Centre in 2004 presented a diagram illustrating how different design research approaches can produce different outputs in terms of truth and inspiration (Figure 2.4).

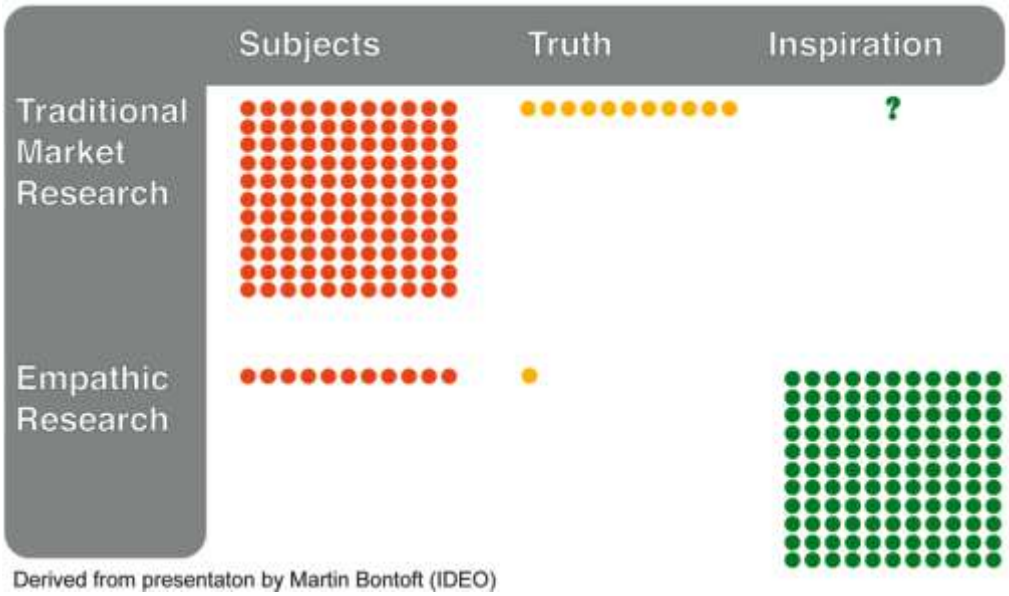


Figure 2.4 - Design research approaches focusing upon truth or inspiration

Figure 2.4 illustrates that traditional market research typically uses a large sample group, from which generalisable 'truth' can be established; however, this truth when presented to designers offers very little in the way of inspiration. Simply relaying a range of answers to straight-forward questions (Mariampolski, 1999) will always be limited by the scope and agenda of the person who constructed the questions, and the ability of the respondents to communicate answers (McDonagh, 2006). An alternative empathic approach might involve a much smaller sample group from which less quantifiable truth results; however, this smaller group can be studied with more depth, and instead of answering a series of questions that only scratch the surface, in-depth conversations can take place (ideally in a natural setting such as the respondents home) that are far richer and revealing, and can thus be more inspirational for design (Bichard and Gheerawo, 2010). This agrees with the notion that human information brings designers closer to knowing those they intend to design for; engagement with these people being critical to people-centred design (Clarkson *et al.*, 2003; Blomberg *et al.*, 2003).

2.2.7 Social science practice informing the design process

Including end users in the design process rather than only considering them to be collections of data is a relatively recent phenomenon (Reich *et al.*, 1996) and owes heavily to social sciences (Bezaitis and Robinson, 2010). Progressive designers focus upon and observe people and their interactions with objects (Laurel, 2003; Poulson *et al.*, 1996; Preiser and Ostroff, 2001; Christophersen, 2002); however, there is a lack of existing literature and guidelines indicating that the consistency and transferability of these observations is problematic, and leaves an extremely difficult task in replicating successful processes, or any future communication and/or re-use of human information capture. This in part could be accounted for by designers being secretive about their research methods and findings (McDonagh, 2006). However, it is clear that the component of people-based observation is now well-established in design and is often credited as the starting point of innovation (Kelley and Littman, 2001).

Design research has been bolstered by the contributions of other professionals such as ergonomists, social scientists and market researchers (McDonagh, 2006). For example, both designers and social scientists are concerned with relationships and composition (Shields, 2002); as experts on human behaviour and external influencers upon behaviour, sociologists have offered a great deal to design (Bezaitis and Robinson, 2010), such as conceptual and analytical frameworks, knowledge on contextual information, and ethnographic skills. There is a great overlap between these professions, yet designers have previously tended to treat much of social science as a knowledge resource to adapt towards modelling users or scenarios (Wilkie *et al.*, 2010). Sociologists are skilled at understanding people's relationships with objects on an emotional and habitual level, whereas designers are more adept at the physical and sensual relationships (Nippert-Eng, 2002). With both disciplines having largely maintained distinctive skill sets, a truly collaborative common ground is still being refined, which leaves the approaches of designers towards users largely still ripe for development (Lawson, 2005). The dimension designers bring to these approaches beyond observing and gathering is a unique ability to digest

material, create interpretations and generate new models based on user insights (McDonagh, 2006). There is potential to collectively grow the approaches to people-based explorations, but knowledge has to be shared, and sources and linkages captured and communicated (Bezaitis and Robinson, 2010).

For some time now social and human sciences practices and practitioners have been crossing into the design field (Wasson, 2000), designers are getting closer to making this journey from the other direction (Bichard and Gheerawo, 2010). Originally consulted to address the lack of expertise in human enquiry within design, sociologists are now commonly members of multidisciplinary design teams, particularly in larger organisations, and designers have been assimilating social and human science approaches, engaging with research techniques that borrow heavily from these disciplines. However, significant room remains for designers to improve the depth of their human enquiry, and to incorporate new forms of human information into their development. Towards this goal approaches are being taken up which move understanding beyond the use of just conventional marketing and anthropometric data, attempting to extract more inspiring and in-depth insights, through observational approaches (Leonard and Rapport, 1997), some directly involving end user groups with the design process (Sanders and Stappers, 2008), or gaining insights into their worlds through techniques which incorporate variations of social science tactics such as those used in cultural probes (Gaver *et al.*, 1999) and variations of these (Mattelmäki, 2006).

2.2.8 Probes as retrieval instruments

It is worth elaborating on the concept of probes, which have emerged as an information retrieval method that has struck a chord within the design community (Mattelmäki, 2008). This approach, which could be categorised as a form of design ethnography, is used to build textural understanding of those being designed for. The probe approach is of interest to this study in that designers are noted as finding it particularly inspiring (Mattelmäki, 2008), which

suggests that at some level it meets designers' information collection needs, which will be discussed in Chapter 3, additionally a variation on the method will be employed as part of the research methodology in Chapter 4 of this thesis. The development of a probe is a creative process in itself, attempting to engage users to elicit rich self-authored feedback through a combination of items (e.g. diaries, cameras, post-cards etc.) This method is particularly useful in understanding people's lives where options for observation are limited or impractical, such as in the case of sensitive settings (e.g. private homes, hospitals etc.) (Crabtree *et al.*, 2003). The material gathered from probes can be designed to include audio recordings, photographs, sketches, mappings, essentially any user-completed form of output the designer facilitates through the probe materials. The original purpose of these probes (i.e. cultural probes) was that they be used outside the domain of 'scientific' problem solving (i.e. towards detailing user requirements) instead they were intended to be more playful, exploratory and inspirational (Gaver *et al.*, 2004). The output being predominantly qualitative, intentionally producing somewhat ambiguous material, the main goal being engagement with those being studied and generation of textured people-based insights (Fulton Suri, 2003). However, although the original technique is well established, the nature of the information generated has often met with modification (Haines *et al.*, 2007) leading to techniques utilised in cultural probes being adopted for different purposes by many designers and researchers, such as the Empathy Probe (Mattelmaki and Batterbee, 2002) and the Informational Probe (Crabtree *et al.*, 2003). In the case of these probes, attempts to gather more than exploratory feedback were being made, seeking to generate a variety of data, including more quantifiable results. However, common threads exist in all the variations upon the probe, in that they intend to engage people, seeking insights that are otherwise difficult to access and generate implications for design (Dourish, 2006).

Probes are a useful example of a creative method for enhancing information and empathy that has been widely accepted in the design community. The

materials retrieved can be designed to be highly visual, rich and varied. The value of this approach in generating design-relevant user based information and contextual insights is indicative of the potential to make creative human information contributions to design development, if support approaches are developed (Sleeswijk Visser *et al.*, 2005) that capture some of the qualities of representation, retrieval, organisation and reflection inherent in probes.

2.2.9 Representation of human information

Throughout the design process designers gather a variety of information in numerous ways, often doing so as and when needed. Initial briefs generally include limited accompanying material, designers are tasked with 'cherry picking', interpreting and at times refining the information to shape it into design relevant material. To supplement this material, designers will also refer to previous experiences and projects, and consult a wide variety of tried and tested sources they have at their disposal; they have little time to devote to reading new materials (Goodman *et al.*, 2007). A notable exception to this internalised process is when the problem is significantly out-with the designers normal areas of expertise, which necessitates the collection of new information (McGinley and Dong, 2009). Within these early exploratory stages of the design process designers are often required to combine available resources in order to inform and inspire their design processes (Lawson, 2005). This material will give some initial insights into the subject area and/or design needs, and be largely drawn from internal research by the design company, the client group, or a combination of both. A large proportion of information applied to problems within design companies is tacit, often derived from intuition or prior knowledge held by the designers (Nickpour and Dong, 2008). Herein lies the potential, if this knowledge is collected, translated and communicated clearly into design outcomes, it has potential to live beyond the project; the alternative being that it is largely lost, embedded in the designers that addressed the brief and the object produced.

Accurate collection and communication of data being used is crucial; the way in which it is presented can distinctly impact understanding and resulting application (Klanten and Bourquin, 2009). According to Strickfaden (2006) when communicating throughout the design process the proficient designer must be able to visualize ideas through creative combinations of a variety of representation such as sketches, renderings, Illustrations, technical drawings, computer simulations, scenarios and contexts etc. These are the communication types that designers are trained and communicate most comprehensively in; however, they are uncommon in much of the conventional research data formats of professionals outwith design; hence these other formats of data require substantial effort to decipher and make design-applicable (McDonagh, 2006), which presents a significant barrier. It is apparent that abstract representations of people based information (e.g. anthropometrics, marketing reports etc.) do not inspire designers nor do the data formats encourage use in design (Marshall, 2010), indeed such visualisations tend to create distance between the viewer and the subject that is being represented (Klanten and Bourquin, 2009). The visually literate audience that makes up the design profession seek realistic and easy to comprehend communications, not unrecognisable constructions accompanied with abstract datasets devoid of human qualities. Hence, there is great potential to be more representative, realistic and engaging when informing about those being designed for, by creating information that considers designers as the audience, meeting their needs, rather than being inhibited by the conventional presentation formats suggested by other disciplines (e.g. academia, marketing science etc.) or the data itself (Goodman *et al.*, 2007). Related to this it is necessary to be careful with content volume (Lawson, 1996), incorporating large databases misses the potential to curate richer succinct insights, that are more fitting for timescales of design development (Bichard and Gheerawo, 2010).

Even within design ethnography practice current forms of collection and communication are limited, typically taking the form of reportage or ‘thick

description' which is not easily accessible to designers and can lead to poor understanding (Jones, 2006). Jones suggests extending ethnographic analysis to more tightly pair ethnography and design for better understanding in the development process; pointing to existing representations such as personas and scenarios, which can guide the design development process, she calls for similar visualizations to aid understanding of the setting, and informing design through experience models (Blomberg *et al.*, 2003). A distinct lack of more human representations exists in current resources with an emphasis on hard data, which has various limitations such as requiring specialist expertise to translate and being inaccessible to most designers (Marshall, 2010). Empathy is posited as a key component of human connection and approaches in information that can convey this quality have potential to improve practice and designer uptake.

2.3 Empathy

Effectively combining the qualities of people-based information and imparting empathy is hypothesised within this thesis to be a means of supporting people-centred design. Empathy within design thinking is considered important on three levels (Köppen and Meinel, 2012) – to empathise with those being designed for; to instil empathy in design teams through user insights; and to design in an empathy enriched way. However, empathy is not a straightforward skill that can be easily learned, instead it is about mentality and outlook, the competencies for which can be complex and difficult to impart (Rogers, 1975).

2.3.1 Empathising through inclusive design

A design movement in which empathy plays a significant role (Battarbee, 2003) and that has undergone significant development in recent years is that of 'inclusive design' (otherwise referred to as 'design for all' in Europe and 'universal design' in America and Japan); many of the principles of which are in tune with empathy-building. Inclusive design considerations are relevant to this study due to inclusive design encompassing such notions as the intent to understand diversity and changing demographics (Clarkson *et al.*, 2003) and the use of insights drawn directly from diverse user groups as points of inspiration (Pullin, 2003; Relph-Knight, 2010). The inclusive philosophy tends to empathise and collaborate with 'extreme' user groups in an attempt to better understand and be inspired by underrepresented groups that reflect changing demographics (Clarkson *et al.*, 2003). Inclusive interactions frequently go beyond simply using tacit knowledge and secondary data to also engage with those being designed for and generate primary data (Clarkson *et al.*, 2003). The movement has created a great deal of relevant principles for what the researcher would deem key components of progressive design (McDonagh, 2006).

The uptake of inclusive approaches although slow (Dong, 2005) has gained momentum due to global demographic changes, such as increasing ethnic diversity and the growing ageing population (United Nations - Department of

Economics and Social Affairs - Population Division, 2009). The ageing process naturally results in the reduction of physical, sensory and cognitive ability, this coupled with the fact that approximately 10% of the world's population (or 650 million people) live with some form of disability (United Nations, 2011) makes it clear that these groups need to be considered carefully, and understood through appropriate information. This is not only logical and morally sound, but is demanded by developments in legislation for older and disabled groups (Home Office, 2010), as well as by groups within society such as 'baby-boomers' being increasingly vocal about their dissatisfaction with the lack of consideration given to their needs (Silverstone, 1996), on top of growing access to information resulting in greater expectations from design (Cagan and Vogel, 2002). It also makes a sound business case relative to the huge number of people that fall into these categories, as demonstrated by marketing terms that have emerged such as the 'grey market' (Petermens and Van Kleempoel, 2009).

A key philosophy within inclusive design is that designers must consider the needs of those that are often overlooked in the design process; amongst effective ways of doing this is to include 'extreme users' (Dong *et al.*, 2005) in the design process. This is an approach often undertaken in the Helen Hamlyn Centre for Design (HHCD), based in the Royal College of Art (RCA), London. The HHCDs 'Challenge' series, pairs design professionals with 'extreme' or 'expert' users who become integral members of the design team and inform and inspire designers about their experiences relating to a Challenge brief that has been set. This process often produces notable results, and challenges designers to include the requirements of underrepresented and diverse end users (Cassim and Dong, 2003; Dong *et al.*, 2007). However, there are barriers, such as the fact that inclusive design processes can be difficult to set up without established access to specific user groups (such as exist within the HHCD); in these cases the process can prove to be both time-consuming and expensive (Crilly and Clarkson, 2006). When opportunities to engage with individuals are not available the consideration of 'extreme' can become a case of referring to 'disabled user data' such as that produced by Henry Dreyfuss Associates (Tilley,

1993) which show dimensional limits; however, this misses one of the most powerful rewards of exploring the area, which is the inspirational material gained when engaging with individuals outside of the 'average' (Relph-Knight, 2010). There are unarguably valuable principles that have emerged from the inclusive movement that are worth considering during any design process, such as the fact that the capabilities of younger people by-and-large are not compromised by designing artefacts to be more in line with older people's capabilities; however, with the (more common) opposite approach predominantly adopted, older persons access needs are excluded (Coleman, 2003). The 'Seven Principles of Universal Design' (Story and Mueller, 2001) are also indicative of the factors important to human information uncovered when undertaking people-centred design. The seven principles encourage consideration of people with diverse abilities and highlight goals such as flexibility; intuitiveness; perceptible information; low physical effort; accessible size and so forth. Some of these elements are especially interesting to this research, particularly those relating to 'diverse abilities' and 'individual preferences', which are exactly the details of human information crucial for a more detailed understanding and new insights (Relph-Knight, 2010). The others highlight good practice, encouraging design that places minimum physical and cognitive demands on those interacting with designed objects. Reflecting developments in recent years these principles have been further developed to present what have been named the 'Eight Goals of Universal Design' (Steinfeld and Maisel, 2012), which are as follows -

1. Body fit. Accommodating a wide range of body sizes and abilities

2. Comfort. Keeping demands within desirable limits of body function

3. Awareness. Ensuring that critical information for use is easily perceived

4. Understanding. Making methods of operation and use intuitive, clear, and unambiguous

5. Wellness. Contributing to health promotion, avoidance of disease, and prevention of injury

6. Social integration. Treating all groups with dignity and respect

7. Personalization. Incorporating opportunities for choice and expression of individual preferences

8. Cultural appropriateness. Respecting and reinforcing cultural values and the social environmental context of any design project.

These more closely echo the principles of this research, being broad ranging with more sensitivity and awareness towards individuals (Fulton Suri, 2003); which can be considered as key to empathising with diverse groups, this awareness being not only physical (e.g. 'body fit' and 'comfort') but also on other levels (e.g. 'social integration' and 'cultural appropriateness' etc.)

The inclusive design movement makes design and business sense (Clarkson *et al.*, 2003); however, some negative connotations are associated with labelling and distinguishing this 'style' of design. These relate to design that focuses upon characteristics such as that of old age and disability, instead of looking beyond these and designing in ways that meet other needs (Donahue and Gheerawo, 2010) towards creating designs that are more pleasurable (Jordan, 1998). These transcend purely ergonomic considerations, moving into a more innovative space where ability is highlighted and empathy emerges (Coleman, 1997). Another negative association for professional designers is what is perceived as an underlying suggestion of academic focus within inclusive approaches, which may be a barrier to mainstream design adoption (Dong, 2005). For these reasons the author will refer to people-centred design in this research, within which he includes the remit of inclusive design, in that it strives to understand and empathise with the individual, and as a process that accommodates the needs of the widest possible audience (Department of Trade and Industry, 2000).

2.3.2 Understanding the individual

Designers no longer have the 'luxury' of relying upon their own personal experiences and understanding (McDonagh, 2006). The intended users experiences should resonate with those of the designer, so a deeper understanding and eventually more successful design can emerge (Buchenau and Fulton Suri, 2000). However, to gain that resonance effort is required from the designer to observe and empathise; not generalising and designing around the 'average' user (Brusberg and McDonagh-Philp, 2002). If access to user groups is problematic the conscientious designer instead of immersing themselves and empathising, may attempt to design in a way that will accommodate a range of end users considering according to anthropometrics and percentile variations. Figure 2.5 is a visual summary adapted from Molenbroek and de Bruin (2005), with graphs illustrating common approaches for anthropometric design understanding, many of which are well integrated into conventional design processes, and yield useful data.

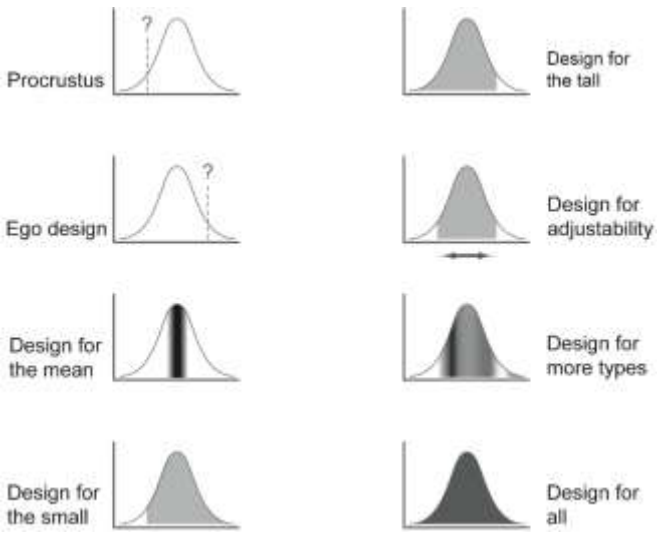


Figure 2.5 - Anthropometric approaches (adapted from Molenbroek and de Bruin, 2005)

However, going beyond these into the realm of immersion (Plowman, 2003), for understanding and empathy is crucial for more sensitive and innovative design outcomes. Considering individuals as percentiles and isolated body dimensions (essentially a collection of numbers and measurements) is a limited outlook, no

matter how thoroughly it is carried out (Marshall *et al.*, 2002). Human variability is far-reaching and taking this into account is essential to the creation of people-centred designs (Kroemer, 2005). Body parts cannot be averaged - every individual has a unique combination of physical traits, which through the course of their life inevitably undergo further change and variation. In order to design in ways that meet people's needs, designers must understand the holistic picture of who these people are, beyond simple body measurements.

One approach used to go beyond measurement is through the use of empathic modelling tools (Nicolle and Maguire, 2003); these tools are physical simulation tools that have been developed to go someway towards mimicking common conditions, such low vision or arthritis (Cardoso and Clarkson, 2012) or even temporary conditions such as pregnancy (Pregnancybelly.org, 2009). Such tools are intended to capture the characteristics of conditions, and allow designers to understand the challenges faced by certain user types when interacting with designed objects, service and similar. However, although such tools can assist in giving designers an indication of a condition they cannot communicate the full experience (e.g. issues relating to pain, emotional factors or variations on the same condition).

2.3.3 Engaging with users and empathy building

User engagement is becoming increasingly commonplace in design discourse (Sanders and Stappers, 2007), the information extracted from such engagements being broad and varied. Current approaches can lead to results that are often unpredictable, being a unique combination of skills and actions answering the design problem based upon the stimuli. Ideally information for design would always be obtained through interaction with the target users throughout the design process, allowing the designer to develop a more thorough understanding and empathy of users, but time and money restrictions within a typical design development process often result in minimal user engagement (Cassim, 2010). Additionally in order to understand the lives of those being designed for, these interactions should occur within their natural

environment and context of use considered (Chamorro-Koc *et al.*, 2008). Again however, the reality is quite different and designers when collecting their own data often do so in more non-contextual and detached settings, finding access a difficulty (Crilly and Clarkson, 2006).

Observing and building understanding are critical to empathy (Brown, 2008), and in order to truly understand users, designers should include these elements throughout their process (Köppen and Meinel, 2012). Unfortunately designers do not often connect with users in a significant way (Lawson, 2005), and it is clearly unusual for the client or designer to be directly representative examples of the intended end user of the object being designed. The impact of this can result in inappropriate design output, with the designer's appreciation of user need misaligning with actual needs. To overcome this designers' need to disengage from individual prejudices and tastes, and immerse themselves in the life of the intended users (McDonagh, 2006). Design solutions have to be grounded in the real context and everyday lives of the people that inhabit that particular context (Fulton Suri, 2003; Battarbee, 2003; Sanders and Dandavate, 1999).

In highlighting the term empathy within human information as an important factor in design thinking, the researcher is stressing that people's feelings towards products and services are critical contributors to product satisfaction. Additionally this is a route to better understanding, and potential innovation (Leonard and Rayport, 1997). Unlike statistical information as typically derived from marketing surveys and similar, the basis of empathic design is observation, with better understanding achieved through engaging with real people in their natural environments (Mattelmaki and Batterbee, 2002). Empathy can be achieved through subjectively immersing oneself in the context of the user (Plowman, 2003) and appreciating their unique experiences and relationships with artefacts (Van Hinte, 1997). This appreciation is key to an empathic approach to design and can be developed through on-going exposure to individuals (Marshall *et al.*, 2002). The empathic approach typically uses little prompting and non-leading questions to capture those being studied as

naturally as possible, particular attention being paid to cues such as body language and non-verbal reactions that can indicate attitudes and emotional responses. Empathy with users requires investment of thought and time, in order to achieve a genuinely representative understanding and connection with those being designed for (Rogers, 1996). It can help a designer take a product offering beyond functionality and usability in product use into the realm of pleasure (Jordan, 1997). Some of the descriptors that Jordan uses in relation to pleasure in products are - security; confidence; pride; excitement; satisfaction; entertainment; freedom and nostalgia. All of which being elements that an empathic designer should elicit from users when considering their design needs. Further to these are 'supra-functional' needs, which include the emotional, spiritual, social, aspirational and cultural aspects (Weightman and McDonagh, 2003); materials for use in the design process should endeavour to represent such needs, which are often more difficult to capture and communicate and hence overlooked.

Empathy and the emotional experience of product and service use are difficult to measure, but are important to appreciate for more insightful design outputs that can cater for the diverse nature and needs of individuals. It is the role of the designers to raise their awareness of these rich resources for inclusion in their interpretations and envisioning process (Postma *et al.*, 2012). A tenet of human factors and ergonomics is to know your user, appreciating that there is no 'typical' user, nor straightforward generalisations.

2.3.4 Design ethnography and the lives of others

To understand the lives of others one must begin by collecting everything they can about them, observing, listening and immersing oneself in everything about them - this qualitative enquiry is referred to as ethnography (Hammersley and Atkinson, 1995).

Human focus in design has developed through approaches that can be likened to ethnography in that they include explorations of indigenous and everyday behaviours; in an attempt to understand and interpret complex consumer

culture in a global context (Clarke, 2011) and to gain creative insights (Bichard and Gheerawo, 2010). This has been adapted from the methods brought into collaborative developments over the last 20 years (approximately) from social scientists. These include the tools of anthropology, psychology and so forth (Bezaitis and Robinson, 2010) leading to design ethnography emerging as an approach, often using design skills to explore user contexts provoking or distorting the current reality through prototyped objects, experiences and scenarios. At times these explorations are taken to an extreme through practices such as critical design (Dunne, 2005), which can have more in common with socio-political commentary or design as art than traditional product or industrial design. Design ethnography has undergone significant development particularly in the field of interaction design (Moggridge, 2007), which is grounded in people's lives and the interactions they have with one another and the objects that surround them. These approaches have seen designers establishing skills such as observation in context and interview, often providing inspiration and to some level grounding to take design development forward (Fulton Suri, 2011). There are significant differences between traditional ethnography and design ethnography. The time constraints of professional design practice rarely allowing for the same level of rigour of classic ethnography (Bichard and Gheerawo, 2010), and design ethnography admits to this as it is not appropriate to design development, terms such as 'rapid ethnography' (Norman, 1999) highlighting this admission.

Unquestionably useful to the design process and to shaping designed outputs (Crabtree, 2012), design ethnography, reportage and field study, however, can be costly and use a great deal of the designers' time, not only in preparing who and what should be observed but also in arranging the access to users (Crilly and Clarkson, 2006). Commercial development pressures often result in very light undertaking or even elimination of people-based investigations in exchange for more accessible traditional research approaches (e.g. marketing etc.) However, the benefits of ethnographic approaches include deeper design-relevant insights and a more immersive understanding of those being designed

for (McDonagh *et al.*, 2009), which are key to empathy building, and hence key to this research. Design ethnography is a powerful approach if undertaken effectively, and can enhance understanding of design problems (Blomberg, 1993). Yet it remains difficult to define and is increasingly developed upon in unique and project specific ways (Crabtree, 2012), with designers creating and refining methods and techniques for unearthing human information through ethnography inspired investigations, covering a large variety of general investigative outlooks (Hemmings and Crabtree, 2002). Jones (2006) goes someway towards summarising the roles of ethnography within design, highlighting the following -

- Identification of 'sensitizing' concepts (Crabtree and Rodden, 2002), which is identification of features of importance to the setting.

- Developing specific design concepts (Crabtree and Rodden, 2002), which is the creation of context specific concepts within the problem setting.

- Driving innovative technological research (Crabtree and Rodden, 2002), which is exploring sociality of environments with a focus upon new technology impact.

- Evaluating design (Hughes *et al.*, 1994), which is 'sanity-checking' designs in situ.

- Context awareness (Jones, 2006), which is immersion in settings to understand context, allowing a more interpretative role in findings.

- Identifying emerging themes (Jones, 2006) – pulling out themes to highlight opportunities within the environment of investigation.

In looking beyond themselves and towards collecting useful insights, the challenge for designers is to move outwith their usual domains and investigate the real lives of people within relevant contexts and observe their relationships with designed artefacts and services (Baillie *et al.*, 2003). Activities of daily living (ADL's) act as useful, quick and broad categories of ability assessments

(Kroemer, 2005); these are the daily routines that everyone typically carries out, such as washing or preparing meals. As these ordinary routines are given little thought, they are free of self-consciousness and reflect people at their most natural, which is ideal for observing quirks and workarounds adopted within natural settings. Such workarounds can be particularly evident and interesting in the case of those that have a notable physical, sensory or cognitive limitation, the adopted approaches often demonstrating impressive lateral thinking (Clarkson *et al.*, 2003). In the design process, it is actions based around these little things that can often provide the spark needed to create something new and remarkable (Leonard and Rayport, 1997). Designers seeking an understanding of the less obvious aspects of people's lives can distinguish their design outputs from those created from over-exploited resources, such as anthropometrics and popular design texts. These deeper insights into people's lives are hugely desirable in design, but difficult to obtain due to factors such as time, money, expertise and access (Sims, 2003; Dong, 2005; Brusberg and McDonagh-Philp, 2002; Crilly and Clarkson, 2006).

To include a process of accumulating insights of everyday lives into their process is a challenge for designers, especially those that have not previously worked in such ways within their established processes. Hence, a clear impression of the benefits or knowledge and structures have to be in place to accommodate their future inclusion (Cardello, 2005), this requires embedding this approach throughout as shown in Figure 2.6.

Figure 2.6 - User insight embedded throughout (adapted from (Sanders, 2009))

2.4 Discussion

Human information is regarded as a key element for a progressive (i.e. current; relevant; appropriate) approach to design, and hence resources are required for on-going information handling. Such resources are particularly relevant to the concept creation or exploratory phases of the design process, where information gathering tends to be most extensive and disparate, and information visibility can have most impact on design thinking, at a stage where there is more flexibility in the brief and critical decisions frequently originate (Lofthouse, 2001). Jones (2006) suggests there is great potential to improve research insights to better impact design, particularly in relation to ethnographic approaches, through better communication tools and visualisations (Neal, 2004). Tools for designers need to accommodate a wide range of viewpoints particularly in the early stages, as ambiguity is useful in concept development where there needs to be room to explore (Bucciarelli, 1988). It is crucial that designers begin designing in a user-centred way in these early phases (Kroemer, 2005) to produce outputs sensitive to user needs from initial inspiration (Eckert and Stacey, 2000). Clearly in order to successfully design for diverse user groups, information about these groups has to be available; however, take-up within design goes beyond this, as not only does it have to be available it also has to be in a format that is accessible and is perceived as having value to designers (Dong, 2004). A highlighted example of where data can fall short was given in the example existing anthropometric resources, which often leave the reader uninspired (Patnaik, 2009). Additionally, such texts are frequently further exposed as dated through the lack of contemporary objects they contain (Butters and Dixon, 1998). Dislocated body parts lacking human qualities are unlikely to inspire empathy in designers, in the same way that sterile environments will not encourage those being studied to act as they would naturally in more familiar surroundings (Burns *et al.*, 1997). This suggests contextual information in realistic settings would create more accurate and appropriate insights, and enlighten designers as to the real

people they are designing for (Ylirisku and Buur, 2007), giving them credible reference to others' lives to utilise in their design thinking.

Although a huge amount of data such as anthropometrics currently exists, means of presenting this information in a format that is consistent, useful and desirable to designers does not. User images (such as photographs, drawings, handwriting, and so forth) have been found to be more effective than words for delivering true feelings and concepts to a designer (Lee *et al.*, 2000), these formats have been successfully incorporated into design research approaches such as the variety of probes utilised in design development. Hence, including these formats are considered an effective means of instilling greater empathy and encouraging more extensive use of human information. Resources representing the intricacies of user diversity and individuality have yet to be adequately addressed; advances have been made in constructing computer-based ergonomic tools, although these predominantly remain within academic settings such as HADRIAN (Marshall, 2010). Other tools have been developed since this research began (the researcher having had lengthy conversations with several researchers that went on to develop these tools), which have attempted to capture the qualities of real people such as designingwithpeople.org (Lee, 2010). Others have looked to engage with novice designers at a more educational level such as the Inclusive Design Toolkit (Clarkson *et al.*, 2012). However, organisation of and reflection upon people based findings in the area of people-based information and empathy has few established support resources (Marshall *et al.*, 2003; McDonagh, 2006b), and none that combine both elements (i.e. human information). There is a plethora of resources dealing in the more measurable and scientific realm of human information (e.g. anthropometrics in tools such as Peoplesize (Peoplesize, 1998)), and more recently tools have emerged, which can be useful for ordering research findings such as interviews and video footage (i.e. qualitative data analysis tools such as NVivo). However, an accessible and designer-friendly (Marshall, 2010) resource that can go someway towards combining variety of qualities of these resources in terms of information and empathy does not yet exist. The resources like the

data itself remain disparate, and difficult for designers to engage with in a coherent way. It remains somewhat of a black art; however, the potential value to design thinking of empathy has been extensively implied through the work of authors such as Jane Fulton Suri of IDEO (Fulton Suri, 2002; 2003). However, the paradox of lifeless information such as anthropometrics used to represent people remains. This thesis proposes that human information should represent real lives through presenting user information and empathy to create fuller stories; conveying liveliness through combinations of visual material (Taylor *et al.*, 2002; Mäkelä and Mattelmäki, 2002). This provides scope for the design audience to interact with the material and complete the interpretations, allowing a level of co-ownership (Hofmeester and De St.Germain, 2000). In order to present more than just data when trying to understand the lives of real people, a variety of strategies and techniques need to be employed towards a truer understanding. There is a clear desire for raw data (McDonagh, 2006); however, conflictingly, in a format that is condensed down to be design-relevant, allowing designers to quickly glean overarching themes, but to also allow depth for 'discovery' of project significant insights (McGinley and Dong, 2009). This is a difficult balance to achieve, demanding a resource that allows both a quick overview of useful information and obvious pathways to further detail. The way the information is organised is therefore key to value it will hold.

Users are increasingly migrating from being designed for to being actively involved in design development (Clement and Van den Besselaar, 1993), at times participating throughout the development phases – for designers to neglect to take full advantage of this and capture their input in tangible ways beyond focused concept critique is a wasted opportunity (McDonagh *et al.*, 2002). There is a strong need for designers to be knowledgeable about those they are designing for (IDSA, 2010), and for them to incorporate this knowledge in their design reasoning. Hence, equally there is a need for resources to support this.

A considerable challenge for this study is identifying how such information formats can be supported and manipulated in effective ways that will add value to existing approaches by designers, and encourage more people-centred considerations. On-going accumulation of user-based data is difficult to manage, and effective communication of human information is a skill that needs to be developed (Fulton Suri, 2011), otherwise findings become impalpably embedded in the designer or the artefact itself. Information fall-out (McDonagh, 2006) is inevitable within product development projects as the detail of used information gets forgotten or misplaced, and also where what is deemed less relevant for the specific problem, is discarded on route to the solution. The potential for re-use of findings becomes limited to what has been tangibly recorded or that the designers can recall (Keller *et al.*, 2006; Keller *et al.*, 2009). In this way human information material that may have had scope to inform and inspire future separate work is lost, and the process of capture has to be repeated in its entirety for each project. Hence it is hypothesised that there is potential to enhance people-centred thought processes in the creative stages, by eliminating the need to rebuild information resources from the base for each new design development undertaken. The potential for human information collection for project use and potential re-use is great, but commercial timescales mean the focus is on delivery of design output, with any non-critical outputs often getting minimal consideration (Postma *et al.*, 2012). Therefore the potential for resources to be in place for on-going collection of human insights as a project progresses, with an eye towards useful information for use and re-use is significant.

Although there has been a shift in focus from the designer to the user (Laurel, 2003), designers' expressing their style and skill through distinctive realisations of designed artefacts is still evident (Sparke, 1998) and will continue to prevail in design practice. However, these unique styles might be extended and facilitated in a resource that would support each designer's approach, allowing them to curate their human information findings of each development they undertake. Related to this, another factor to consider in people-centred design

is that people are often not in a position to communicate their needs, due to a lack of knowledge of, for example, technological possibilities coupled with the tendency of people to develop coping strategies and not notice design shortcomings, i.e. you cannot verbalise something that you do not have the insight to project (Leonard and Rayport, 1997). Needs as communicated by laymen can lack design novelty, being based on existing experiences and typically a more limited knowledge of the area under investigation than held by the designers; however, with the help of designers these communications can become collaborative design inputs (Sanders and William, 2001).

Support needs to be in place to bring together people-based insights alongside designers' unique skill sets to maximise the potential for crystallisation (Fulton Suri, 2011). Information communicating everyday lives within everyday contexts can be extremely powerful in informing designers as to how people naturally interact with artefacts. Understanding can be enhanced through richer stories that communicate information and empathy (Thompson, 2001).

2.5 Summary

This literature analysis has covered three key topics (i.e. design process, people-based information, and empathy). It intended to communicate current information resources that are typically available to designers, and establish the theory and concepts needed to expand upon these to offer support to new modes of human information use. Scientific approaches such as those that dominate anthropometric data capture, hold value in communicating statistical data and similar but do not fully align with designer's needs (McDonagh, 2006). Nor do marketing science approaches with generalised information formats that yield little insight into the individual (Bontoft, 2004).

It has been suggested that optimal tools for designers should be 'simple', 'intuitive', 'highly visual', 'fast', 'easy to learn' and 'easy to work with' (Nickpour and Dong, 2008); however, this is not currently the case (Cardoso *et al.*, 2005; Goodman-Deane, 2010) with tools misaligning with designer's needs (Cardello, 2005). Yet one must be careful not to over-simplify and create commoditized toolkits as are found in market and consumer research (Bezaitis and Robinson, 2010) bereft of true individual insights, or relevant to the designers working processes (Goodman-Deane *et al.*, 2010). It is hypothesised that empathic design support is required for observation, data capture and reflection (Leonard and Rayport, 1997); all of which are themes that will be investigated through this thesis.

The prospect of a system that could encourage reflection-in-action and learning based on previous work, stored and displayed in an effective manner is a compelling one (Keller *et al.*, 2009), it could prove extremely useful to record decision pathways and design rationale throughout a project, and could help provide insight and inspiration to assist in the crystallisation of ideas (Walters and Gardner, 1988). Beyond individual projects it could allow sharing of knowledge more effectively through a system that allows access to gathered information and influencers upon previous design outcomes. A repository for

such references could aid their integration into a shared knowledge base for the team towards making reasoned design decisions.

Goldschmidt mentions that references must relate to the current design agenda, which touches upon a challenging issue of reuse; designers can be wary of following previously travelled paths as it seems to conflict with the idea of innovation and original thought (Frayling, 1993); however, if situational human information references are collected holistically, they will be open to new interpretations and applications.

To date, there has been no system found that addresses the areas highlighted in this literature analysis, hence the suggestion of an exploratory resource for the representation, reuse and reflection upon human information towards people centred design will be investigated through the empirical studies within this thesis.

Chapter 3. Building a design research framework: Investigating the potential of human information and support resources

The literature analysis established that current information resources do not align with designers' approaches and needs, and that the available data is missing an increasingly recognised and vital ingredient of human connection and understanding - empathy. The studies in the proceeding chapters intend to investigate real-world contemporary designers' practices and attitudes in regard to information and empathy within the design process. The studies will investigate new arrangements of human information and the impact they can have upon the design process. New models of information collection and manipulation to support human information building will be examined by designers, particularly at the conceptual stage where credibility can be a concern and where information gathering tends to be most extensive and disparate. The propositions will include information sources currently available and utilised by designers, and also integrate other mixed media information collections typical within a design investigation. The conjecture being that such exploratory resources can enhance the designers' approach through enabling new connections and imparting inspiration and insight through information and empathy.

3.1 An overview of research methodology

According to Gray and Malins (2004) research is defined as a process of disciplined enquiry shaped by three questions: what, why and how. 'What' deals with defining the research question and 'intelligence-gathering' (Phillips and Pugh, 2005); 'why' explores wider context and the value of the proposed research within it; 'how' focuses upon developing a methodology to generate and process the required information. The 'what' and 'why' questions have been answered in Chapters 1 and 2 respectively. The 'how' question will be summarised in this chapter, which will give an overview of the methods and approaches adopted during this research. It will describe how an understanding of the combined role of information and empathy in the commercial design process was explored, and also how the themes (i.e. representation, retrieval, organisation and reflection) identified during the literature analysis were investigated to validate their value and establishing their potential role within support resources.

Three key features of research within the arts and humanities are defined as - clear questions to be addressed through research and objectives allowing exploration towards an answer; establishing rationale and context for the questions and identifying the contribution of the project to this area; specification and rationale for research methods addressing the research questions (Arts and Humanities Research Council, 2012). The research methodology detailed in the following chapter was used in this thesis towards addressing the research question (as posed in Chapter 1):

> What is the current and potential role of human information in the design process, and how might this role be supported and enhanced?

And sub-questions:

> What are the requirements of a resource to facilitate inclusion of human information in the design process? (Addressed in Chapter 4)

What role does people based data currently have in design development? (Addressed in Chapter 5)

The literature analysis established the position of information and empathy within current design practice and the potential relationship these elements might have together.

3.1.1 Research strategy

A research strategy can be considered the approach adopted in the investigation being undertaken, and the methodology adopted for data collection (Walsh and Wigens, 2003).

Quantitative and qualitative approaches differ not only in terms of the techniques used but also the data collected (Creswell, 2009), as this study's priority was investigating the nature of designers and design thinking, the choice was made to focus mainly upon qualitative approaches. Several researcher texts (Creswell, 2009; Yin, 2009) suggest the best way to gain good information is through a combination of both (a mixed methods approach), which was considered and implemented to an extent in some studies such as the probes.

The author as an experienced design practitioner has some advantages such as offering a more informed standpoint and being trusted (Gray and Malins, 2004) to undertake roles within design projects, which were examined as case studies within the research. It was considered crucial that the research involved participation in 'real world' projects to maintain 'real-world applicability' (Phillips and Pugh, 2005) and maintain relevance to designers, instead of falling into a position of purely academic relevance.

To explore the wider context of the design process and the value of information and empathy within it, two real-world studies were conducted. Flexible research strategies suggested by Robson (2002) were utilised towards this goal -

- Case study 1 (exploring human information *prior* to the design process)

- Case study 2 (exploring human information *during* the design process)

- Ethnographic studies (through the use of probe studies and follow up interviews)

A multi-method strategy was adopted to investigate the research topics to allow comparison and triangulation of a range of sources (Gray and Malins, 2004; Creswell, 2009), towards evidencing the research questions, and identifying further routes for investigation beyond this thesis. This approach was considered more likely to produce a representative understanding than any single method, and the information from a variety of positions more appropriate for testing ideas within a complex research issue (Gray & Malins, 2004). These included adopted and adapted social science methods such as interviews, questionnaires, surveys, case studies and participant-observation. Experimentation was used to a limited degree in the workshops as it requires the investigator to have a high level of control over the events (Robson, 2002), and as this study is concerned with views and opinions of designers it was necessary to allow them as much flexibility in their actions as possible. Hence the majority of the analysis involved coding and clustering of qualitative findings. This thesis will report a flexible design strategy used for the research (Robson, 2002), the qualities of which mainly being -

Deal primarily with non-numeric data (qualitative strategy).

Try to establish the worth or value of something (e.g. intervention, innovation or service) with a focus on process.

Typically involving participation of others in the research towards an action agenda.

Involve some limited quantitative data collection, intended as a means to ‘sanity-check’ qualitative findings.

3.1.2 Research Approach

There are four overall elements of consideration within this study: background theory, focal theory, data theory, and contribution (Phillips and Pugh, 2005).

The 'background theory' (i.e. Figure 2.3 – Inclusive Design Knowledge Loop) relates to knowledge of the field of study, in this case examining the many influencers upon human information within the design process. This was mainly demonstrated through the literature analysis, which reviewed and evaluated literature in the field, identifying and summarising what was considered the most relevant areas.

The 'focal theory' relates to the detail of the research, which mainly requires clarification of what is being researched and why it was chosen. In this case a framework for empathy in design (Kouprie and Sleeswijk Visser, 2009) was selected. This framework highlights four phases - 'discovery' which is described as entering the world of the user; 'immersion', which is described as becoming familiar with the user's world; 'connection', which is described as achieving resonance with the user experiences; and finally 'detachment', which is where the designer detaches from the user's world with their perspective in mind for use in their design thinking. In this thesis the focus is specifically through the combination of people-based information and empathy within design, and the potential for resources to assist designers in utilising these combined elements towards creating more appropriate designs to meet needs and generate more people-centred designs. This is detailed throughout the study.

The 'data theory' justifies the relevance of the process and findings towards supporting the thesis, as well as some epistemological discussion about the interpretative framework. In this case qualitative primary data drawn from exploratory studies utilising prototype testing, case studies, workshops and cultural probes.

The 'contribution' refers to highlighting the importance of the thesis to the design discipline. In this research there is an indirect contribution through

highlighting the value of information and empathy combinations for informing design, and the potential to offer support through resources that aid representation, retrieval, organisation and reflection of human information. Existing theory focuses upon information, without the empathy element. This contribution, though limited by the opportunities to engage with large number of designers and live projects and the control held over these, can also be seen as a starting point, having established the scope for information and empathy resources to impact design outcomes.

The generic research process that was broadly applied to this study involved the following steps suggested by Gray and Malins (2004) -

> Planning and preparation for research (i.e. organising and conducting workshops and live project engagement; probe preparation; prototype building)
>
> Surveying the research context (i.e. literature analysis; probe studies; case studies)
>
> Locating the research questions in relation to the context (i.e. professional experience; professional interviews; case studies)
>
> Generating and gathering data through the use of research methods (i.e. probes and interviews; case studies; workshops; design resource building)
>
> Evaluating, analysing and interpreting the research outcomes (i.e. implementation of materials in live case studies; evaluation of the resource prototypes)
>
> Communicating the research findings (i.e. conference papers and presentations; journal publications)

The proposed combination of information and empathy was detailed in the literature analysis, with the suggestion of a means of supporting human information being confirmed as an underexplored domain. The purpose of this

study was to explore what resources designers typically refer to and the position of information and empathy within their processes. From here the intent was to create support proposals in terms of both content and structure, particularly for the early exploratory and defining stages of design development where management of knowledge is one of the most important considerations (Myers, 1996). Through testing elements of these proposals with designers through workshops, and participation in live projects the goal was to propose potential routes that resources might take to assist designers with information and empathy use within their design process, leading to a fuller prototype concept to be evaluated in order to identify directions for future research.

3.1.3 Theoretical positioning

Qualitative research typically begins with a research question(s) over a hypothesis, as the purpose of such research is to explore phenomena through theory building rather than theory testing, inductive theory is mainly associated with this approach (Bryman and Teevan, 2005). According to Sim and Wright (2000) exploratory research tends to involve inductive theory, where observation is the start point and sense is made of these observations towards formulating frameworks of understanding (Sim and Wright, 2000). This is in contrast to deductive theory, which tests hypothesis based upon existing theory, and is typically based upon quantitative methods (Bryman & Teevan, 2005).

This thesis will deal primarily with inductive theory. The literature review illustrated the currently limited role of information formats and the growing use of approaches such as design ethnography as a way of understanding people beyond numbers; however, there was little in the way of previous exploration of resources to support the use of these information sources. Additionally there was a distinct lack of research combining elements of representation, retrieval, organisation and reflection in the context of human information in design. This implies that these under-explored themes require an inductive research approach.

3.1.4 Epistemological Background

As a relatively young discipline (Cross, 2007) design research by necessity has borrowed and adapted methods and approaches from other disciplines. For creative practitioners the scientific concept of a methodology can be limiting, the concept of 'protocols' where the rules of conduct are made explicit bringing transparency to the process (above complete transferability) can be more useful (Gray and Malins, 2004). This study took a pragmatic approach to methodology, adapting to opportunities to involve commercial projects and participants. Methodological choice is a result of ontology and epistemology, or what is knowable and the researchers' relationship to this (Guba, 1990). Where design research is concerned, it is in its infancy and the more artistic/designerly modes of enquiry are still to be defined, requiring a pluralist multi-method approach, qualitative and naturalistic. It is useful to explore the key epistemological standpoints, in order to have a better understanding of the associated issues (Gray, 2004) and build confidence in the chosen approaches, particularly considering the themes being investigated throughout the thesis concern for design knowledge. Gray and Mallins (2004) discuss the epistemological issues of design where the practitioner can often also be the researcher, and responds to problems through practice, a multifaceted role that (in this study) includes –

Generation of research material

Observer of others for context

Co-researcher and facilitator on projects

Positivism and interpretivism are two perspectives within sociological research, where positivism is strongly linked with objectivism (Gray, 2004), which argues that like the natural sciences reality is directly observable and there is only one single objective reality, regardless of individual values, attitudes and perspectives (Sim and Wright, 2000). Due to this kind of approach typically involving statistical testing and similar, quantitative approaches are most commonly associated with it (Henn *et al.*, 2006). In opposition to this stance is

the concept of interpretivism, which argues that unlike in the case of natural sciences, human beings are complex and can formulate varying responses based upon interpretations and ideas, therefore there is not one single objective reality, hence the social world needs to utilise a different perspective and procedure (Bryman and Teevan, 2005). Interpretivism is strongly linked with constructivism, which asserts the stance that the laws of science and the laws of social reality are distinct from one another and therefore require different methods (Gray, 2004). Qualitative research approaches and theory building are most commonly associated with interpretive approaches (Henn, *et al.*, 2006).

On a disciplinary level this thesis falls most fittingly within social research, as it deals with people and their individual attitudes, practices and responses to the material within this research, looking not for a singular truth but instead to make sense of the viewpoints and preferences of a variety of designers with regard to information and empathy. Based upon these collected traits, resources were developed to explore new propositions in information and empathy use, to draw some level of consensus regarding their value to the design process.

The opinions and practices of designers is fundamental to this study, hence the epistemological standpoint of this research aligns with constructivist and interpretivist theory.

3.1.5 Validity and reliability

Validity and reliability as defined within quantitative research are often difficult to apply to qualitative approaches; the approximation of truth derived from the conclusions of research (Henn *et al.*, 2006) implies a specific truth, which as discussed earlier is more in line with positivism and not interpretivism and constructivism which are more in line with the stance of this research. Due to the differing epistemological standpoints qualitative and quantitative research require different modes of evaluation (Smith, 2000). According to Robson (2002) there are three challenges to validity in qualitative research –

Reactivity – effect of researchers' presence on study setting

Respondent bias – effect of situation on respondent's behaviour causing them to act in an irregular way

Researcher biases – effect of the researchers preconceptions and similar affecting setting or reporting

To reduce these factors a variety of strategies were adopted such as triangulation and peer debriefing (Creswell, 2009). However, as this PhD thesis is the work of an individual in its collection, analysis and interpretation there is the possibility of some degree of bias. Reliability can be considered from two perspectives internal and external (Bryman and Teevan, 2005). Internal reliability involves more than one researcher's involvement and agreement upon the findings, which in the case of this research included case studies in which the researcher was a lead researcher within teams; co-creation of resource concepts carried out with professional designers; and evaluation of a prototyped resource with experienced professional inclusive designers/researchers. External reliability involves the findings being replicable, which in the case of replication for qualitative studies can be attributed to the reliability of research recording (Perakyla, 1998), which the researcher has accomplished through thorough capture in various mediums (i.e. photograph; video; audio; written) throughout the research, and presented within this thesis.

3.1.6 Methodological choices

In this study it was considered important to be pragmatic about methodology and adopt a variety of approaches that would allow real-life enquiry using existing methodological steps as markers more than explicit rules. The research questions were considered alongside existing guidelines to inform research strategies (see Table 3.1).

Table 3.1 – Relevant Situation for Different Research Strategies (adapted from Yin, 2009)

Strategy	Form of Research Question	Requires Control of Behavioural Events?	Focuses on Contemporary Events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, How many, How much?	No	Yes
Archival analysis	How many, How much?	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

The research questions for this study consisted of several 'what' questions, which according to Yin (2009) are due to the fact they are exploratory rather than inspecting prevalence, hence are suitable for all methodologies. Hence, this study incorporated a variety of approaches such as –

- Case studies – to examine what nature of human information is needed throughout for live commercial design development projects.
- Probes and interviews – to examine what current people-based information practices exist within professional designers' studio environments.
- Exploratory workshops – to examine what professional designers consider useful resource formats for delivery of human information, and what characteristics their proposals would include.
- Evaluation of prototype – to examine what the value of an operational web-based human information resource is as appraised by inclusive design professionals.

3.2 Research Framework

The work undertaken during this research included four connected cumulative studies, as shown in Figure 3.1. The approach consisted of positioning, descriptive studies (to understand designers' current practices and attitudes relating to human information and associated resources), prescriptive studies (to develop concepts and criteria for resources that can support human information use) and evaluation (to evaluate the prototype resource developed).

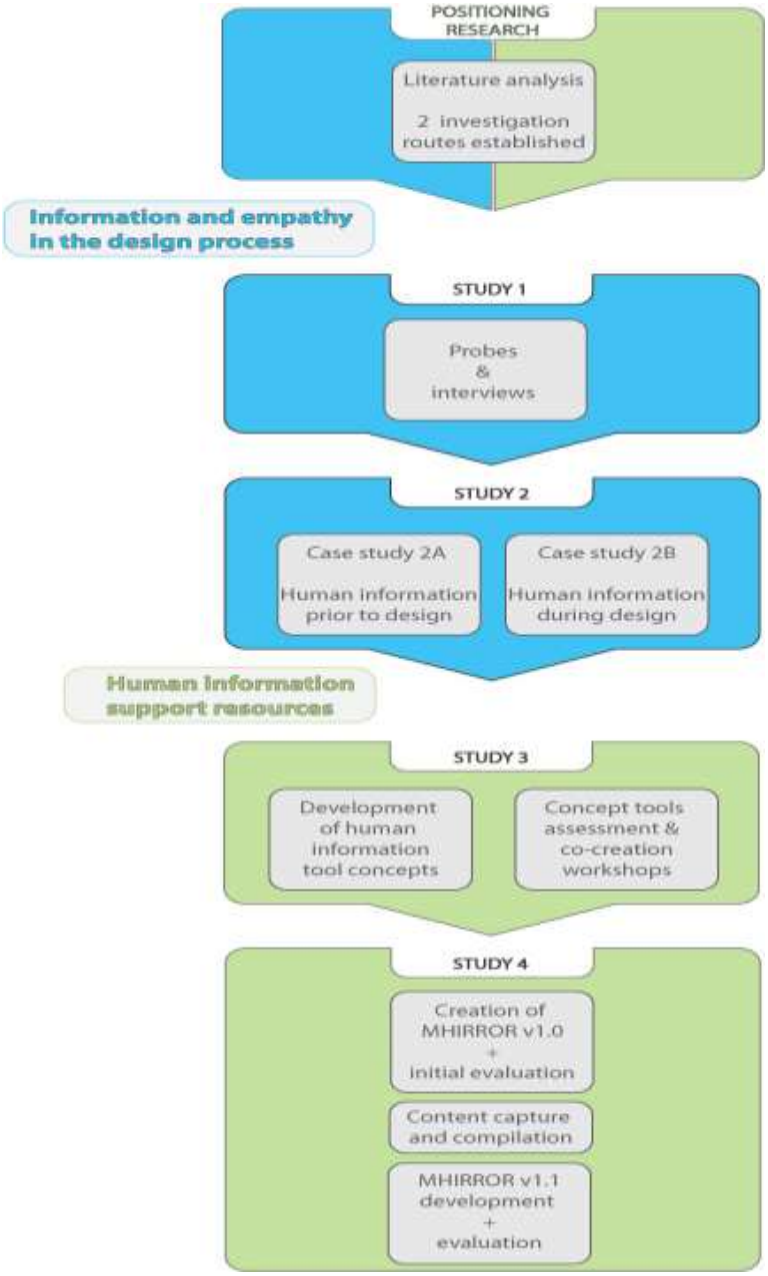


Figure 3.1 – Cumulative studies within research framework

3.3 The Design Research Methodology (DRM) Framework

This study can be considered design research about how designers carry out research; therefore, it was essential to ensure 'buy-in' not only in terms of methodology but also findings and suggested resources. Hence, a major consideration in methodological choices was transparency and maintaining a level of familiarity to designers. The DRM (Blessing, 2004; Blessing and Chakrabarti, 2009) sits well within these criteria in that it follows a comparable format to a typical Product Development Process (PDP) as it establishes criteria followed by iterative development, which could be considered a sequential approach consisting of understanding, prototyping and refining. Hence, a variation upon this model was used to structure the research (Figure 3.2), composed of four main stages -

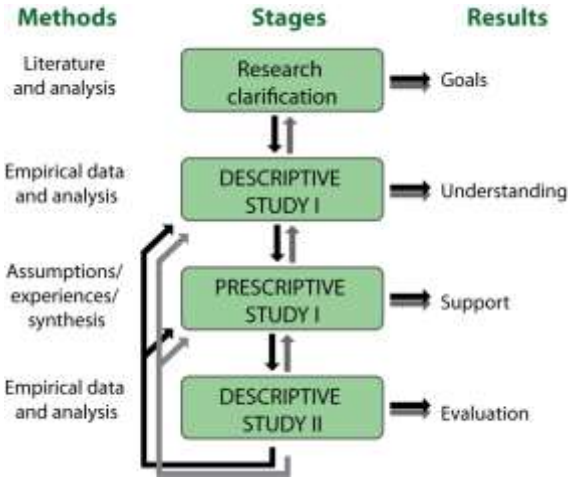


Figure 3.2 - Design Research Model (adapted from Blessing and Chakrabarti, 2009)

Research clarification involves identifying the goals of the research, through establishing a preliminary understanding and focus, the main research questions and the relevant areas to be reviewed are as follows -

Descriptive study I, involves understanding the criteria broadly to identify influencing factors on success

Prescriptive study, involves taking the understanding established through the previous stages in order develop methods of support

Descriptive study II, involves testing and evaluating the support developed in the prescriptive study

3.3.1 Research Clarification

The research question of this thesis is -

What is the current and potential role of human information in the design process, and how might this role be supported and enhanced?

There are two constituent elements to this question, the first being the role of human information in the design process; the second being support resources. These driving themes within the research are addressed through the proceeding studies.

3.3.2 Descriptive Study I

Probe kits were designed and distributed to professional designers. The purpose of these being to understand contemporary practice within designers' own domains and studio practices, in terms of resources designers retrieve and reflect upon.

The probe kits included a visual survey, disposable camera, and a mapping exercise. Follow-up interviews were carried out to clarify the material returned and further explore the designer's opinions on information and empathy.

Robson (2002) states that for surveys (which the probes were equated to), samples should be drawn on a representative or sample basis. The sample chosen was designers with over 3 years of professional design experience and with knowledge of inclusive design (this was judged upon recommendations from experts and reviewing design portfolios). The initial sample group included varied geographical locations across Europe (Holland, France and Denmark), and 20 kits were sent out. However, as the returned 10 kits were mainly from the UK (only two were returned from outside the UK, and these particular

participants had masters degrees from UK based institutes, and had worked in the UK previously) the results can be considered to have a UK context.

The probe study was followed by the first case study where the researcher participated as a lead researcher and participant-observer to create a brief and accompanying stakeholder information for designers. Research was undertaken to refine the criteria of a design problem, and resources were produced to communicate information of importance to designers, exploring how one might represent, retrieve and organize information for use *prior* to the design process. A post project interview was carried out with the company to assess the value of the information provided.

In the second case study, where the researcher once again participated as a lead researcher where a brief was already in place to, the responsibilities in this project were to respond to the information needs of designers, exploring how one might retrieve and represent and reflect upon information for use *during* the design process. With a brief in place the researcher took responsibility for gathering and communicating information based upon the designers' requests. A post project interview was carried out with the company to assess the value of the information provided.

3.3.3 Prescriptive Study

A suite of concept resources were developed primarily based upon findings from the literature review, in addition to the probe studies and follow-up interviews, and were later evaluated through two workshops.

The first workshop focused upon professional designers and the second workshop upon final year undergraduate and postgraduate student designers. The groups were invited to provide feedback on resource concepts that were presented, by first individually rating based upon initial impression, then discussing and rating in groups, and finally participated in co-creation exercises, where the best concepts/features were used within designers' own concepts of their 'ideal' tools.

Following this, a static prototype resource (prototype 1 – paper-based) was developed based on three earlier trialled and demonstrated during a tool evaluation workshop examining existing resources (detailed in chapter 7). Designers critiqued the content and format and suggested features, in comparison with other established resources.

It was then necessary to capture real information and empathy content to populate the concept tool (i.e. prototype). This was in the form of observational information, which was collected, compiled and combined with information corresponding to measurements of the participants (both primary and secondary).

3.3.4 Descriptive Study II

A working resource of the Human Information resource (prototype 2 – website based) was then developed. The web-based resource was tested by Research Associates based at the Helen Hamlyn Centre for Design, who undertook a specified design task, creating concepts based on the information contained within the resource.

They assessed the resource through a questionnaire and brief interview assessing how it assisted their process of concept creation. The assessment was based upon the value of the information and empathy they perceived in four 'human information' aspects (i.e. representation, retrieval, organisation and reflection).

3.4 Summary

The research design for this project can be summarised as follows:

The purpose of the research was to carry out an exploratory study in order to provide new insights into the role of information and empathy within design development, and to establish the support needs for designers to enhance the inclusion of these elements. To explore this a mixed method research strategy was used which combined – survey/probe exercises to establish habits and processes within a commercial setting; real-world case studies to establish information and empathy role within commercial projects and timescales; concept generation for rating and co-design exercises; resource prototype development, and prototype testing through concept generation exercises.

This strategy of multiple data sources was useful for triangulating the findings and also helped:

- Generate a rich and elaborate background understanding of the issues involved in integrating information and empathy into the design process.
- Develop a rich picture of designers' existing resource practices and preferences.
- Build a better understanding of perceptions of available human information and new propositions.
- Identify what is effective and desirable to designers in order to assist in the use of human information.

The proceeding chapters will begin by first explaining the 'probe' exploration carried out towards understanding commercial practice and resources designers typically use, and the follow-up interviews conducted to further explore the participant's current practices in regards to information and empathy.

Next it will detail the research and outputs from participating in two case studies to investigate key stages of information need focussing upon retrieval and representation, i.e.:

Information for brief generation (case study 1 – Safe Ways In Glass)

Information for concept generation (case study 2 – Design Bugs Out)

It will then describe how designers' information representation and organisation preferences were explored through the development of a collection of prototype tool concepts and a follow-up assessment and co-creation workshops carried out with designers.

Finally it will summarise a preliminary evaluation workshop conducted to corroborate the approach being taken, before a process of sample information capture and compilation was carried out. This is followed by the process of gathering and compiling content for a working resource to be assessed during a final workshop, there designers were tasked with tackling a design problem and questioned as to the effectiveness of the tool in enhancing their appreciation of information and empathy during the design process and generating concepts inspired by the resource.

Chapter 4. Understanding designers' human-information approaches: probes and interviews

In the previous chapter the research methodology was described, with the structure and purpose of the studies within the research framework illustrated. This chapter will report on the first of the descriptive studies, which consisted of probe studies and follow-up interviews, forming a major section of the investigation into means of 'human information use in design'.

4.1 The Probe Study

The probe study was used to explore designers' current practices and attitudes towards human information resources. Insights were captured regarding current practices and individual studio environments, which aided in determining current human information use of designers within their work environments, providing insights into what was typically referred to, used or available to inform, and how this is managed. Using these insights the exploratory themes were developed upon and further explored through semi-structured interviews, to begin to identify possibilities for supporting existing design processes through resource proposals. The goal was not only to identify content that might be supported but also to establish what characteristics of designers' approaches to data might be supported or otherwise, hence complying to currently embedded work habits.

The concept of the 'cultural probe' was developed by interaction design researchers in the late 1990s (Gaver *et al.*, 1999) and has become a well-known tool that many designers have found useful in design development (Mattelmäki, 2008). However, like the artefacts of critical design, cultural probes are not intended to propose 'solutions' but instead to explore environments by stimulating new design dialogues and discovering new opportunities. In this study probes were used with designers to gain insights that were otherwise proving difficult to obtain (i.e., their day-to-day human information use within their own environments). This approach was useful in initiating dialogue with selected designers and as 'primer' to the research being carried out. Probes were considered particularly useful in this context as they could be completed within private work settings, could capture unprompted naturalistic tendencies, habits and opinions, could provide the basis for better informed follow-up interviews, and allowed more creative response through a combination of both visual and textual prompts and response flexibility.

The following sections will discuss the probe process in terms of recruitment, format and tasks, and present the findings gathered from the process.

4.2 Recruitment of participants and timescale

Participants for the probe study were selected based upon their previous experience in the field of inclusive design; this selection process used purposive sampling followed by snowballing. The participants were identified through two main channels: the Helen Hamlyn Centre for Design (HHCD), which is a leading research and design centre in the field of socially inclusive design; and the Design Business Association (DBA), which holds an annual competition for excellence in the field of socially inclusive design called the 'Challenge'. Initially 12 participants were contacted, this number was considered to be valid for identifying key issues (Hartwig *et al.*, 2003; Nielsen and Molich, 1990) and manageable in terms of producing the probe kits and delivering them on schedule. The designers were selected based upon having either participated in HHCD work or having participated in the DBA Challenge. The participants were contacted by phone or email and, upon receiving agreement from 10 designers to participate a probe kit was dispatched to each of them. The kits were dispatched in mid-December 2009, in order that they be in place prior to the Christmas break. It was felt this timing would be a particularly suitable period as the start of a new year is often considered a period of self-reflection and resolution, hence the kits would be particularly appropriate. The participants were contacted in mid-January 2010 with a reminder to return the probe kits, and again at the end of January. By mid-February five probe kits had been returned; due to the limited response a second round of probes were distributed. This time the selection method was based upon recommendations from Julia Cassim of the Helen Hamlyn Centre, the organiser of the DBA "Challenge", and from the original participants, and as such took the form of snowball sampling (Bryman and Teevan, 2005). Another 10 kits were compiled and dispatched and again the response rate was 50 percent, the final probe being returned in late March 2010.

The probes initially were distributed over Europe (i.e., Denmark, Holland and France); however, due to the initial responders being all based in the UK it was deemed more effective to only consult UK-based designers in the second round.

It was also felt that this would also allow more controlled comparison, free of additional external geographic influences, and would additionally make face-to-face interviews easier to arrange.

The 10 participants from 10 separate design companies that completed the probes and were interviewed were all professionals in at least a senior role within their company, with a minimum of six years industry experience. The respondents were selected from product design disciplines, with specialities varying to allow some breadth in response. The focus of each of the participants design work can be seen in Table 4.1.

Table 4.1 - Participants design specialism(s)

Designer	Area of design expertise
P1	Product
P2	Medical/Product/Vehicle
P3	Medical/Product
P4	Musical Instruments/Packaging/Product
P5	Medical/Product
P6	Medical/Product/Service
P7	Product
P8	Lighting/Luxury/Product
P9	Accessories/Fashion
P10	Furniture/Medical

4.3 Probe development

Probes were developed during October and November of 2009, in order to be ready to dispatch prior to 2010. The probe was developed with reference to the 'Cultural Probe' (Gaver *et al.*, 1999), as detailed in Chapter 2.

4.3.1 Pilot

Before the formal probe was deployed to the designer participants, a pilot test run was carried out that focused upon the postcard tasks; this format of cards are frequently included within probe kits, they provide some form of instruction or prompt. Tasks are typically completed on the card and posted back to the researcher. For the pilot test two colleagues were selected based upon previous experience in design development (at least three years) and knowledge of inclusive design (at least two years of research experience). This allowed assessment and adjustment to the clarity of the questions and prompts posed, resolving any issues with content and design. Feedback informed refinement of the visual language and wording, and the postcards were compiled into a 'exercise booklet', in order to obtain more controlled responses and placing equal importance upon each task. Additionally the questions were redrafted to be more visual and require less text-based instruction.

The pilot probe participants also strongly indicated that the follow-up interviews would be critical for eliciting more thorough responses and insights, as the probes themselves can only yield relatively limited information, which were open to interpretation that could be later clarified and expanded upon through interview.

4.3.2 Material development

The development of the printed materials was conducted over a two-week period, including pilot material production and inspection over three days at the beginning of this development. The identification and collection of the other probe 'kit' materials (e.g. stationary etc.) was completed over an additional week, with the kits designed to a high specification, using quality materials and

contents (i.e. high quality stationery and binding, within a stylish folder), the hope being the quality would encourage a better response rate.

The probes (see Figure 4.1) contained seasonal 'incentives' as a way to lighten the mood of the study and hopefully encourage better response rates. The proposition to designers was that the probe would allow them to reflect upon their work in the year just passed and think about their approaches taken towards human information, and how this may have influenced their design processes and outputs. The completed probes would present insights into habits, approaches, outlooks and opinions.

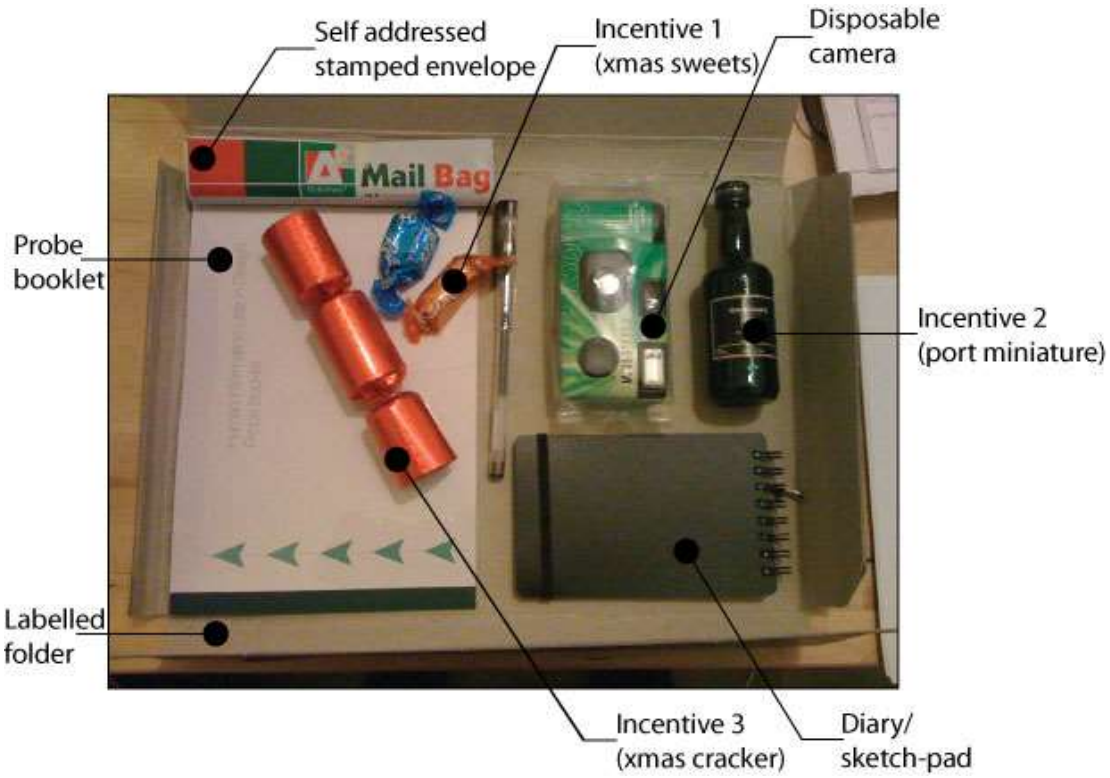


Figure 4.1 - Human Information 'probe' with seasonal 'incentives'

4.3.3 Introduction to designers

The probes were delivered with an introductory front sheet, which thanked the designers for agreeing to participate in the study and explained its aim (i.e. trying to understand how they use people-related data and insights in their design process). It was further explained that this phase was exploratory to aid

in understanding approaches and encourage them to reflect upon their own processes and how users fit into these. They were instructed to complete a booklet titled 'human information use in design', and that a disposable camera was also contained within the pack, as were instructions on how to use it. Finally they were instructed to return the probe and camera upon completion, using the enclosed stamped and addressed envelope contained within the kit.

The tone of the introductory sheet was friendly and relaxed, as was the desired responses from the participants. The goal of the probe was to introduce designers to the study and to 'prime' them on the area of human information and their relationships with it.

Beyond this sheet participants were given little in the way of guidance to allow them to make their own interpretations and identify areas that the designers themselves considered important. They were informed that they could call or email at any time if they required further information.

4.3.4 Probe booklet

The designer probe kits were designed following a similar format of the original 'cultural probe' (Gaver *et al.*, 1999), and included the equivalent of postcards in the form of an exercise booklet (see Appendix A), which made up the main tool for information capture. This was in addition to a disposable camera with photographing prompts and a blank diary.

Postcards were utilised in the original probes to explore research participants remotely. The method allows completion at the participants' convenience, as this was a desirable feature of this study To encourage response, packaging and postage was included to minimize inconvenience and hence encourage the designers to participate. The booklet tasks were designed to be simple and intuitive and included a degree of flexibility in order to encourage designers to express some individuality and creativity through text, drawings and photographs.

The probe booklet covered the following content (Figure 4.2).

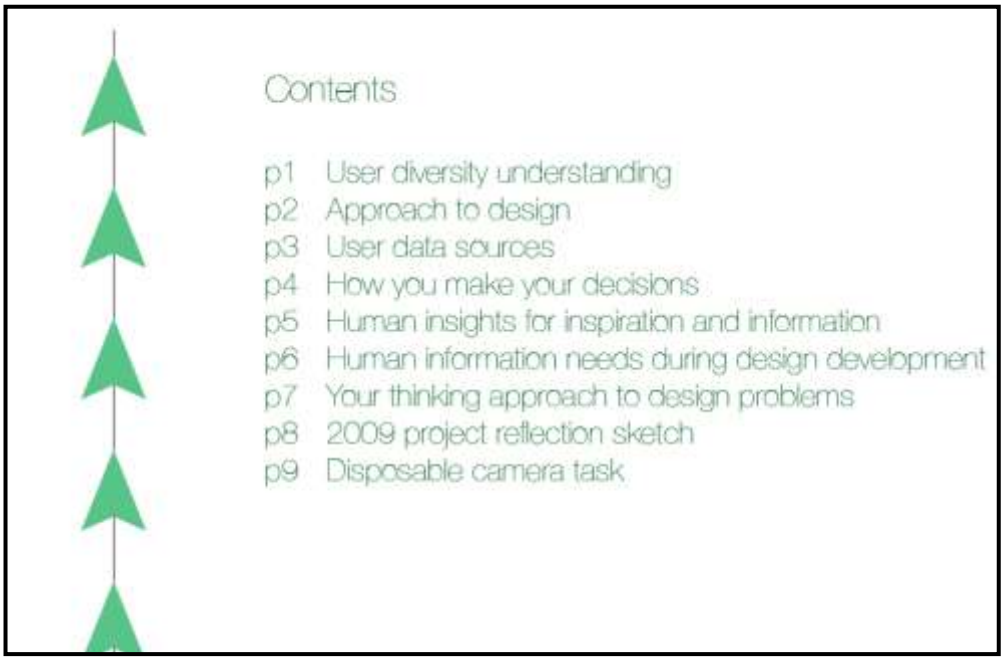


Figure 4.2 – Probe contents sheet

The booklet contained a variety of visual and textual prompts to pose a variety of questions relating to human information in the design process, as can be seen in Figure 4.3.

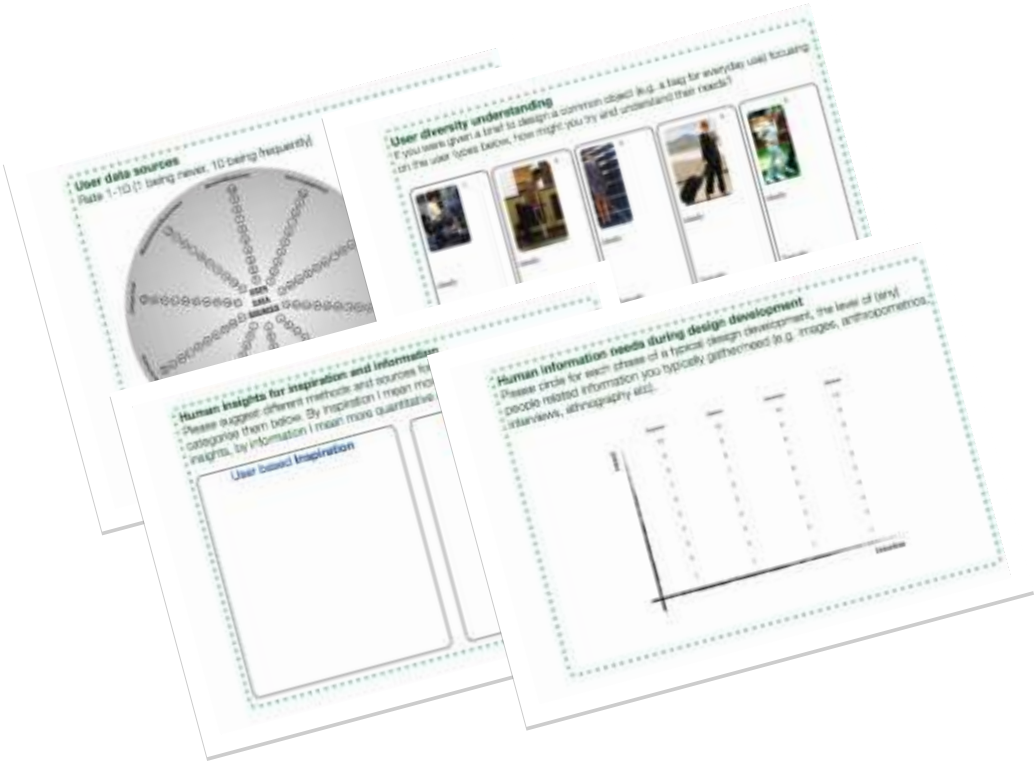


Figure 4.3 – Example sheets from the probe booklet

Specifically participants were instructed to address issues explored during the literature analysis, through the following tasks in the probe booklet:

User diversity understanding: If you were given a brief to design a common object (e.g. a bag for everyday use) focusing on the user types below, how might you try to understand their needs?

The goal of this line of enquiry was to gain insights into designer's approaches towards understanding those they are designing for; to uncover the range of tactics adopted by designers towards understanding a wide range of people with differing capabilities.

Approach to design: Please circle a number on each scale that corresponds to your design approach.

The goal of this line of enquiry was to gain insight into designer's thinking approaches; through probing how designers perceived their approaches in terms of scales comparing scientific-artistic elements, and systematic-intuitive elements. This would give an indication of what styles of information the designers felt most comfortable with.

User data sources: Rate 1-10 (1 being never, 10 being frequently).

This line of enquiry explored emerging information practice; the goal being to gauge the popularity of data sources designers currently refer to, and what should be supported as far as possible through resource offerings.

How you make decisions: Please circle one number on each side of the scales below (i.e. four circles in total) to represent your typical approach to decisions during a design project.

This line of enquiry explored design thinking; the goal being to gauge how decisions were made, and whether data impacted these, or it was a more intuitive process. It also queried as to what extent client provided data and specifications featured in these decisions.

Human insights for inspiration: Please suggest different methods and sources for insights about end users, and categorise them below.

This line of enquiry explored emerging information practice; the goal being to gain the designer's perspectives as to how they seek information and how they seek inspiration about people when designing.

Human information needs during design development: Please circle for each phase of a typical design development, the level of (any) people related

information you typically gather/need (e.g. images, anthropometrics, interviews, ethnography etc.)

This line of enquiry explored use of human information in the design process; the goal being to plot when during design development process (i.e. the sequential, discover, define, develop, deliver - 'Double Diamond' design process model) designers felt people-related input was important.

Your thinking approach to design problems: Please shade the areas in the diagram below, to represent how you typically think when approaching design problems.

The goal of this line of enquiry was to examine human information in the design process, through giving the designers a selection of broad characteristics to choose from relating to their thinking approach, to gauge whether or not patterns emerged.

2009 project reflection sketch: Roughly sketch or map the key elements of one of your design projects from 2009, and show where end user information influenced your process and thoughts.

The goal of this line of enquiry was to gain an insight into the reality of the participants human information use in their design process, by asking for mappings of projects the designers had recently participated in, demonstrating where and when user based input was used, if at all.

4.4 Findings

As far as possible the designers were left to complete the probe unguided and in their own time; however, they were contacted every fortnight via email from the initial dispatch until the probes were returned, to encourage completion and return. All participants were enthusiastic in their responses, and gave reasonable reasons for any delay (typically commercial project related deadlines taking priority).

Upon the probes being returned, the responses were documented, organised and interpreted.

4.4.1 User diversity understanding and approach to design

To explore the approaches designers might take to understanding those they design for, one worksheet provided examples of five different user types of differing ethnicities and other obvious traits (i.e. reduced mobility teen in motorised scooter; young man using crutches; blind business middle aged woman; older traveller with luggage; senior woman jogger). Participants were asked to list how they would attempt to understand these various users' needs. There was some variation in what was suggested by each designer; however, most designers listed a set of approaches then repeated them for each user type regardless of individual characteristics. This seems to indicate that designers will tend to investigate a variety of users using the same approaches. An additional trait of note was that there was a significant variation between what the participants considered to be an ideal scenario to understand the users, and what was the typical scenario. Their responses were compiled, listing the words and statements used. In order to work with more meaningful words/statements superfluous descriptors and punctuation was removed, abbreviations were completed, slang/colloquialisms were changed to more conventional words, small and/or non-relevant words (e.g. it, and, the) were removed, singular and plural words with same meaning grouped, and finally similar words grouped (e.g. user, users, people). The resulting list of words was put through a word counter (http://www.wordcounter.com) to assess

frequency of the words/terms used and tabulate in a descending table (see Table 4.2, 'ideally' and 4.3, 'typically').

Table 4.2 – *Ideal* methods used, when designing for diverse users

Word	Frequency
Work with user groups	**19**
Ethnography/observation/shadowing	**19**
Interviews	**18**
Investigate existing products	10
Advocacy groups/organisations/societies	6
One-to-one discussions	6
Internet based research	5
Prototype trials	5
Interviews in context	5
Investigate lifestyle	5
Questionnaires	4
Visit environment	3
Mimic/simulation	3
Talk to caregivers	2
Focus groups	2
Diaries	2
Marketing team	1
Scenario testing	1

It is clearly demonstrated (as shown in highlighted text) in the responses that engaging with people in a variety of ways is considered the ideal, with "work with user groups", "ethnography/observation/shadowing", and "interviews" being the top three 'ideally' responses. However, the actuality was shown to differ considerably from this ideal as can be seen in the 'typically' responses (Table 4.3), with "interviews" being the only user engagement to feature in the top three. The next of the top three ideal ways to gather design information identified in the previous table (Table 4.2) 'ethnography/observation/shadowing' features fourth in the list, and 'work with user groups' fifteenth. Apart from 'interview' the most typical information gathering approaches appear to consist of methods that do not directly involve end users, such as 'internet', which was the highest rated approach, also included were other non-interactive approaches such as 'mimic/simulation', 'research existing products/benchmark', and 'scenarios'.

Table 4.3 - *Typical* methods used, when designing for diverse users

Word	Frequency
Internet	20
Interview	**12**
Mimic/simulation	11
Ethnography/observation/shadowing	**9**
Research existing products/benchmark	7
Scenarios	6
Advocacy groups/organisations/societies	6
Blogs/trends	6
User testing	5
Investigate lifestyle	5
Previous experiences	5
Flickr	5
Questionnaires	4
Consult client	4
Work with user groups	**4**
Empathic simulation	3
Literature	2
Self test	2
Industry/market-research	2
Profiling	2
Best guessing	1
Consult an expert	1

4.4.2 Approach to design

This task followed a likert scale format, where designers were asked to indicate the thinking approach they take in their work in terms of a scale of 'scientific-artistic' and 'systematic-intuitive', with the intent of gaining an insight into how they work and what styles of information might suit their thought processes. One participant did not give a rating, but instead commented –

"It depends upon the project"

Of the remaining participants the average scores were derived from their ratings in order to rank each theme (Figure 4.4).

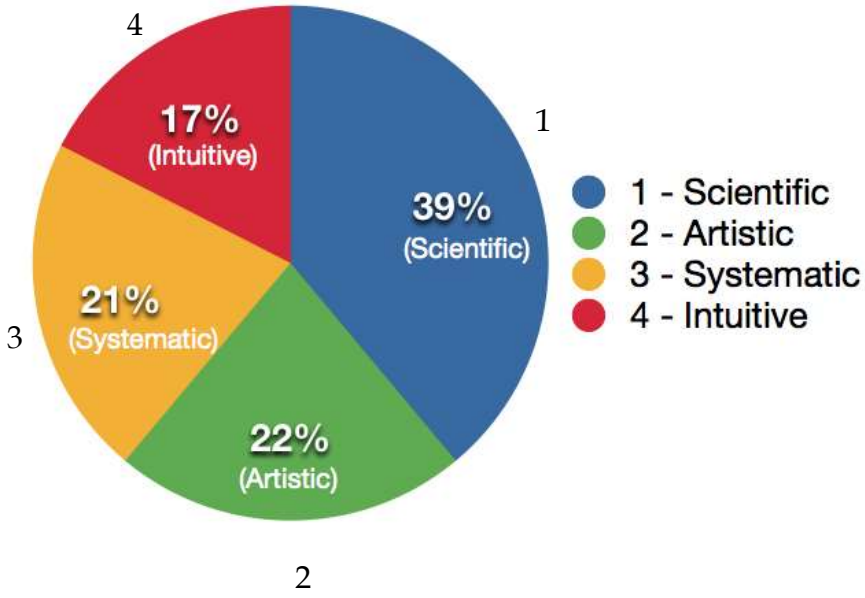


Figure 4.4 – Approach to design

4.4.3 User data sources

Another task followed a likert scale format, where designers were asked to rate a selection of information sources in respect to how often they would consult such sources to obtain human based information for use in their work. From this it could be derived that 'measurement/experiment' was ranked highest, followed by 'internet', and the least consulted sources were 'ergonomics literature/software' and 'friends and family'. From this question average scores were obtained and plotted in the pie chart (Figure 4.5), which shows all the options that were proposed from the highest weighted (i.e. 1 – measurement/experiment) to the lowest (i.e. 10 – ergonomics literature/software). There was an additional segment included that allowed designers to insert any additional sources they consulted that had not been included. Most designers left this blank; however, two participants responded

with suggestions of “own experience”, “random things”, “retailers”, “conferences” and “user forums”.

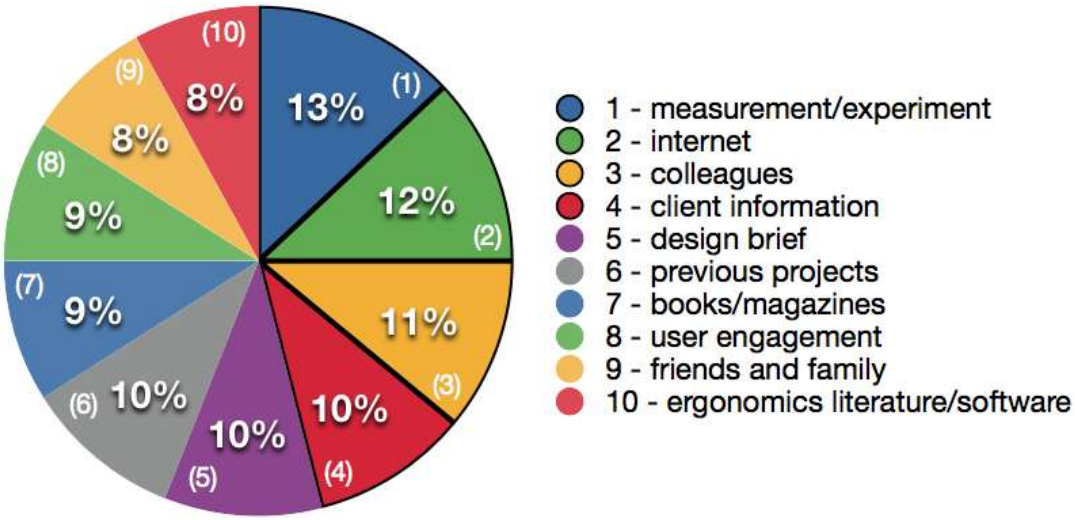


Figure 4.5 - Frequency of user information sources consulted

4.4.4 How decisions are made

This line of enquiry explored design thinking; the intent being to gauge how decisions were made, whether the designers considered it a rational process, how their intuition impacted decisions, and whether formal data such as a product design specifications and the brief/client data impacted their decisions. The responses consistently indicated a balance of all of these factors, the average scores are shown in Figure 4.6.

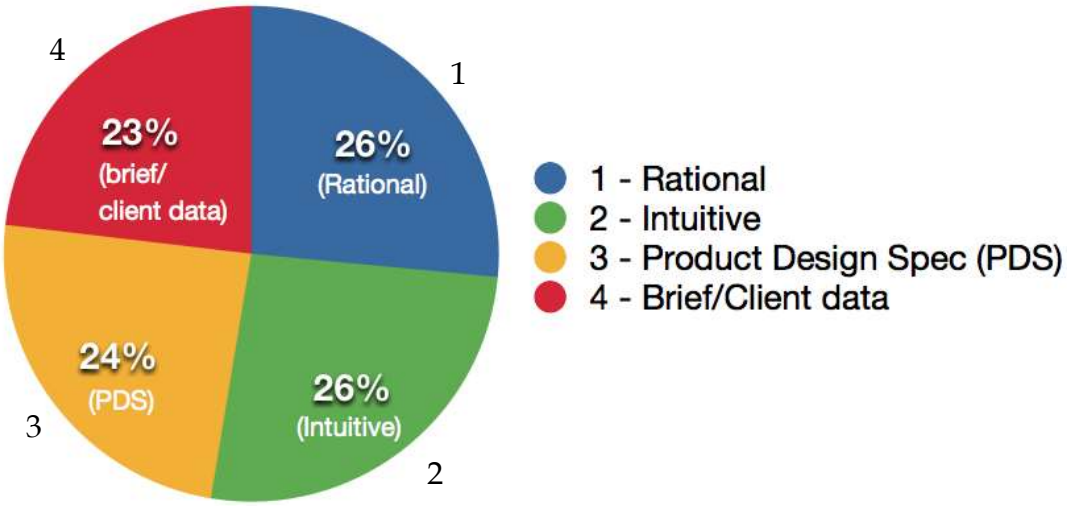


Figure 4.6 - Thinking approach in design process

4.4.5 Human insights for inspiration and information

This was a straightforward listing task, which essentially requested that the designers list their methods for sourcing people-based insights, and categorise their suggestions as ways of providing inspiration or information. This was prompted by an eco-design tool concept developed by Lofthouse (2001) where inspiration and information were identified as two critical forms of content that designers seek. The researcher's intent was to explore how this might pertain to people-based content.

One participant stated that - "going out and talking to people provides both". The other nine participants listed a range of approaches under the categories of 'inspiration' and 'information' as follows in Tables 4.4a and 4.4b consecutively.

Table 4.4a – People based insights for inspiration

INSPIRATION
Insights into everyday life
Everyday life and experience
Observation
Video diary
Photo
Informal discussion where people share ideas/problems – video recorded
From discussion (random, verbal inputs) which can be collected from
Real worlds research (e.g. ethnography)
Observation (natural and controlled)
General people watching
Discuss what users want, what they do now and what gives them most hassle, pleasure and effectiveness
Research probes
Observe users existing approach(es) to the problem/product/activity
Try new solutions for myself along with existing products, photos, key quotes
Anecdotal/friendship based information
Fittings
Expert consultation
Discussion and argument
Seeking out experts in an area
Co-creation
Asking for drawings/creative ideas from users without judgement
Design provocations (show and respond; workshops; co-relate)
Marketing approaches
Small focus groups
Interviewing
Brainstorming areas that have been seen in research
Trends reports
Interview
Trend analysis
Research into competitors
Shop research & customers
Researching culture
Culture websites
Foreign cultural approaches
Non-recent history (museums/libraries etc.)

Table 4.4b – People based insights for information

INFORMATION
Existing publications/software
Data sources: MOD handbooks of anthropometric data
Magazines (i.e. economist) newspaper stories etc.
Dreyfuss and similar. Anthropometric data (e.g. hand sizes, hand force, etc. percentile
Client produced data (e.g. sales figures, markets)
Statistics
'Peoplesize' data and software
Written documents by users or specialists which can be collected from academic articles
Books, magazines
Expert consultation
Institutions concerned with user group
Testing
User testing - e.g. - testing the amount of force people can apply on buttons - e.g. - injection devices arthritis patients who inject regularly.
Measure handgrip (for example) of a variety of typical users.
Measure: speed, performance and effectiveness in using prototypes, test rigs and alternative products.
"Time/error" measurement based testing of users of a design.
Marketing approaches
Questionnaires/feedback forms
Interview/census of opinion
Consumer data (e.g. Mintel)
Sales figures
Information/feedback from customers
Feedback from buyers/sales people
Web-based
Internet
Web forums – searching through reviews and posts
Web based statistics

Both categories were populated with a significant amount of classic marketing approaches such as interviews and trend reports. However there was a clear difference between what designers considered each category to consist of.

Inspiration was predominantly indicated to be related to methods for uncovering the activities of everyday life and experience and gaining user input in a variety of ways, with a lot of observation of those being designed for through watching, informal discussion, ethnography and capturing users in mediums such as photo and video.

Information was predominantly indicated to be related to consulting existing sources or measuring and experiment with key groups.

4.4.6 People-related information need through the design process

This line of enquiry explored use of human information in the design process in the sequential categories of 'explore', 'define', 'develop' and deliver'. The averaged use across the process as indicated by the designers demonstrated the importance of human information early in the process (see Figure 4.7).

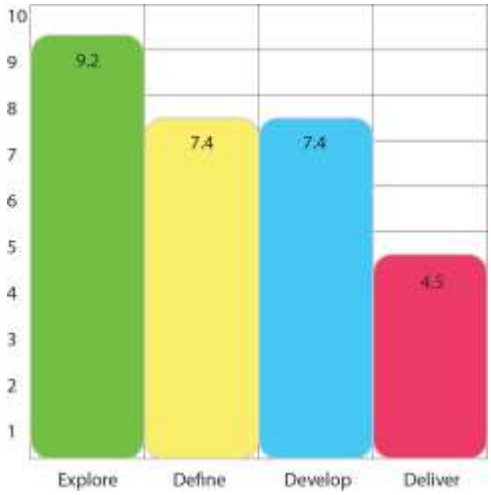


Figure 4.7 - Human Information need through the design process

4.4.7 Thinking approaches

The probes, on the whole were intended to produce a more general qualitative insight into designers' practices; however, some questions were posed to obtain responses that could be further processed. For example a question posed about thinking approaches, allowed designers to shade in areas they believed applied to their design thinking given the artistic options of 'intuitive', 'emotional', 'empathic', on one chart and the logical options of 'process driven', 'rational' and 'systematic' on another. These classifications that emerged from the literature analysis were considered by the researcher to be broad yet provocative, which would encourage completion. Although this task was open to variations in how it was shaded, it allowed some quantifiable analysis. Figure

4.8 illustrates the variety of ways the diagram was shaded; in this figure the shading produced by all 10 participants is overlaid onto one diagram.

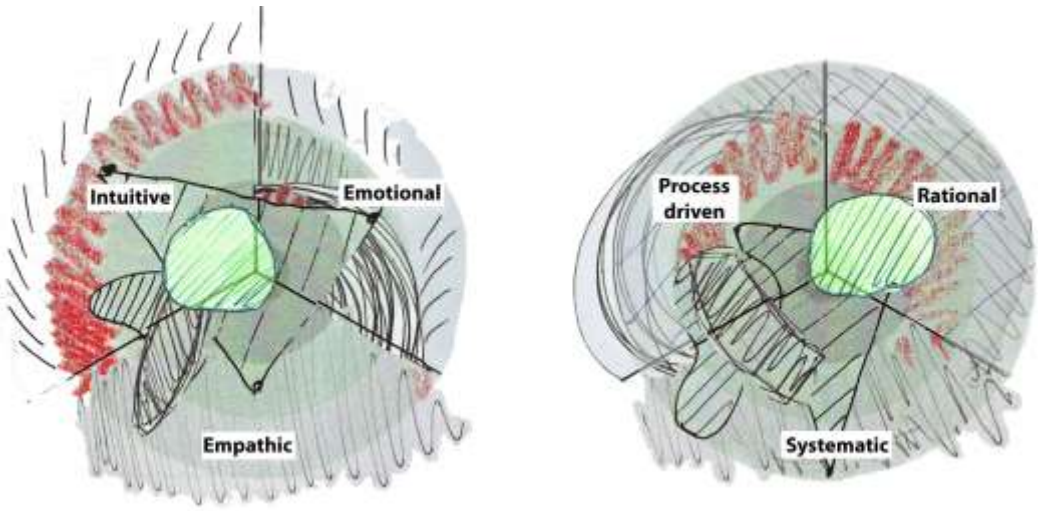


Figure 4.8 - Overlaid responses to 'Your thinking approach to design problems'

This effect was achieved by scanning all 10 responses and using picture-editing software (i.e. Photoshop CS5.1) to crop the shaded sections and then overlay the 10 layers onto one diagram. The purpose of this approach was to produce a visual representation of any patterns in their thinking approach. Due to the variety and multi-modal approach that each participant displayed, the diagram demonstrates that across the group they believed their approach to have multiple characteristics, and touched upon several of the options presented, the interpretation of each individuals response was confirmed with each participant during interviews.

To further and more clearly visualise this data individual participant responses were collated onto separate bar charts (Figure 4.9), representing both the logic and artistic choices they made (participant 1 and participant 2's charts are enlarged for legibility, with the others include in a smaller format, to allow an overview of the responses). These charts show that the designers had a slight tendency towards a thinking approach with 'empathic' and 'systematic' characteristics; however, on the whole all participants believed they had some level of balance between the various stated characteristics, and none placed themselves solely within one artistic or logic segment.

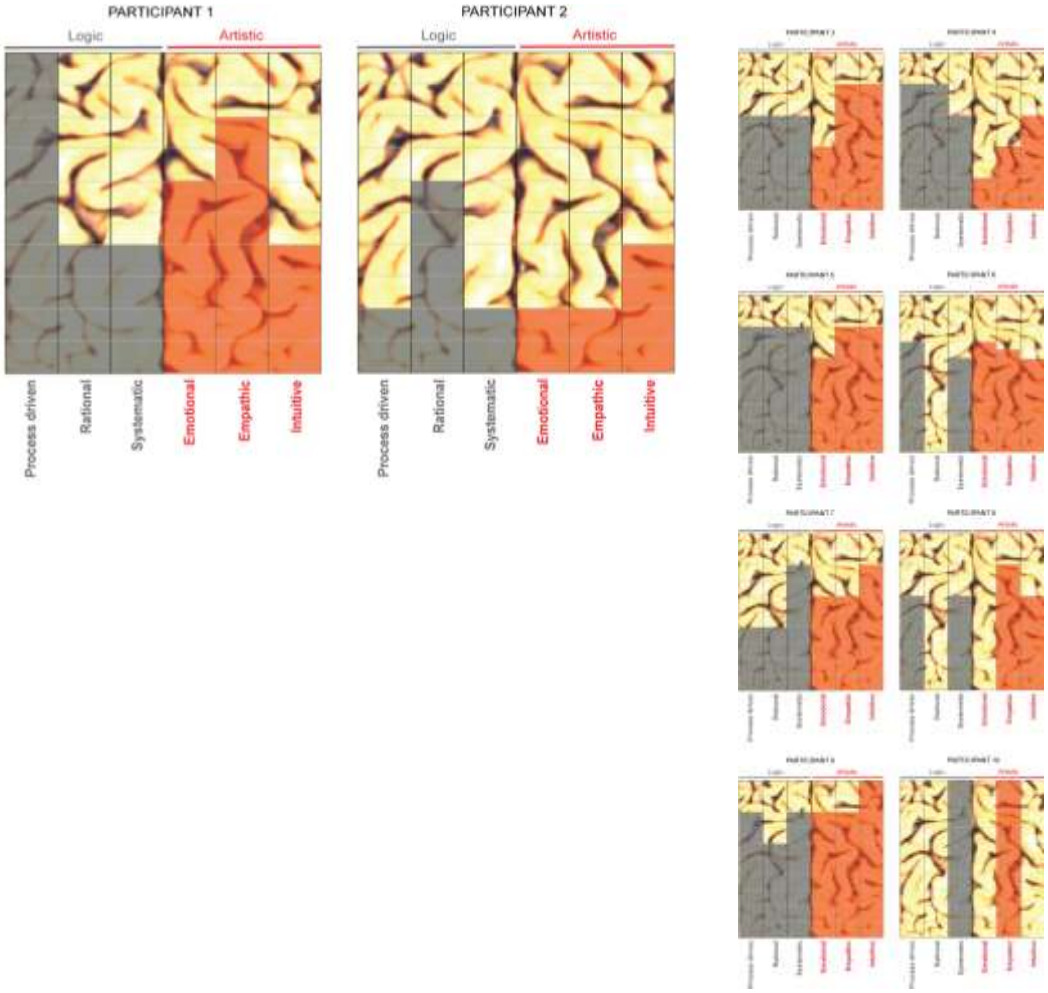


Figure 4.10 – Individual designers' 'thinking approach to design problems'

4.4.8 Project reflection sketch

One of the booklet tasks asked for a reflective mapping of a recent project to be completed, highlighting where end-user information influenced the process and thoughts. The responses to this varied in both content and approach, but were useful pictorial examples of each participant design process, and the role of user data in their process. 20% of the designers indicated testing at the prototyping stage as the only user input (see example in Figure 4.10); 60% indicated some early user input in addition to later testing (see example in Figure 4.11); and 20% noted user input as happening only early in the design process, and not later in testing.

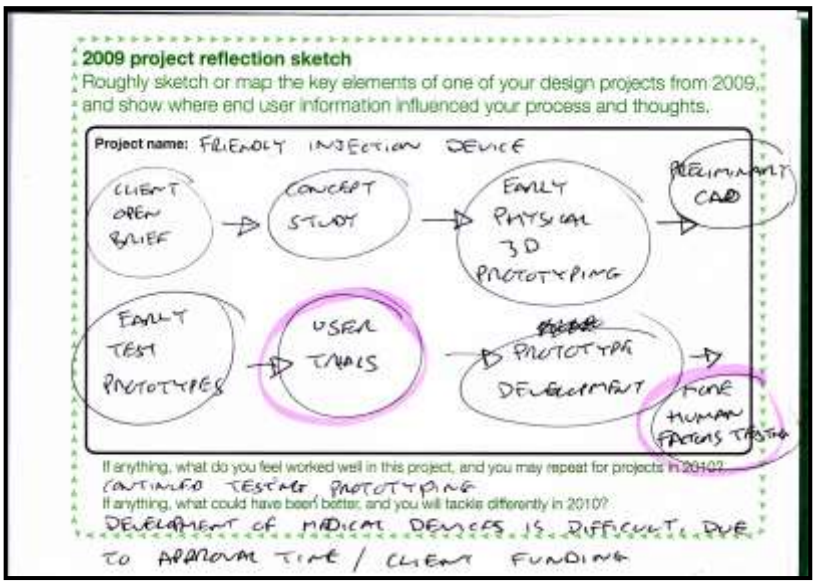


Figure 4.10 - Map/sketch of recent project and user information influence

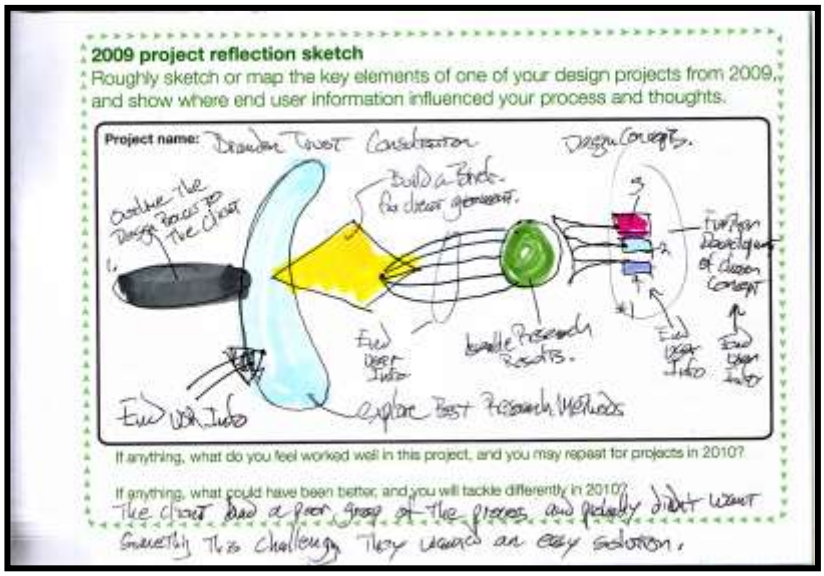


Figure 4.11 - Map/sketch of recent project and user information influence

4.4.9 Camera task

In keeping with the original 'cultural probe' format, disposable cameras were included, which encouraged the participants to take photographs to capture additional content about their environments and habits. The use of photographs added qualitative depth to the probe study by visually capturing work environments and contents. It was also useful in familiarising the author with the setting prior to the follow-up interview (as the cameras were returned with the probe booklet by mail, and developed prior to the interviews). Prompts were given for one third of the camera spool, to give an indication of the kind of information that was of relevance to the study, the rest of the images being left to the designer's discretion/imagination. There was a 70% return rate on the disposable cameras, with one designer providing alternative 'stock' images due to confidentiality issues, a further two participants did not provide any images, again stating confidentiality as the reason.

The photograph prompts included requests such as ‘a picture of you’ (see Figure 4.12), which allowed an easy introduction to the camera task, and also made it easier for the researcher to keep track of which set of pictures had been taken by which designer.

Figure 4.12 - Example of ‘a picture of yourself’

Another prompt requested that a picture be taken of ‘the book(s) you reference most often’ to gain an insight into referenced materials. Generally designers took pictures of a variety of books on their bookshelves. The emphasis tended to be on manufacturing based books, or books showcasing existing designs (such as ‘Designing the 21st Century’, or ‘1000 Chairs’). In three instances publications that dealt with people sizes and similar topics were photographed, these publications were ‘Human Scale’, ‘DTI AdultData’, and a ‘Complete Idiots Guide: Anatomy. Illustrated’ (see Figure 4.13). However, later in the follow-up interview it was revealed that the ‘Idiots Guide’ was being used in a project specific way, as a reference to human anatomy and terminology used in discussion with medical professionals for designing representations of body

parts, and not as a general people-related information source for design projects.

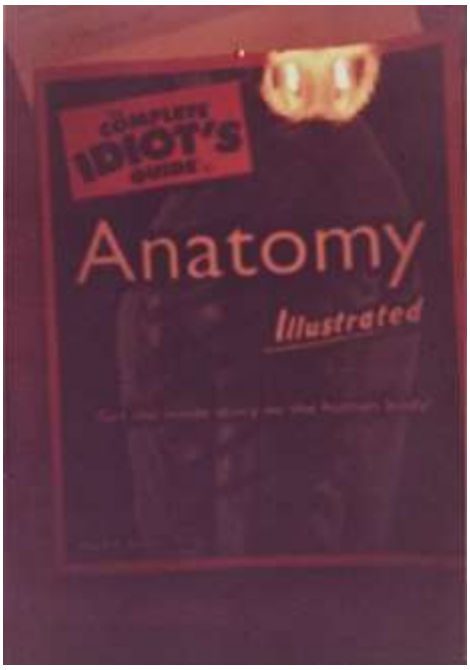


Figure 4.13 - Example of 'book(s) you reference'

Other prompts included requests such as - 'something in your studio that inspires you'; 'something in your studio that bores you'; and 'a design that inspires you'. These prompts were posed to get a broad insight into the interests and attitudes of the designers, and a feel for their environment. One of the more specific prompts requested an image of the 'website you reference most often'. Responses to this included images of websites (see Figure 4.14) such as 'flickr', 'net-vibes', 'google', 'core77' and various blogs. The goal of this prompt was to get an insight into online resources that were currently consulted and preferred by the designers.

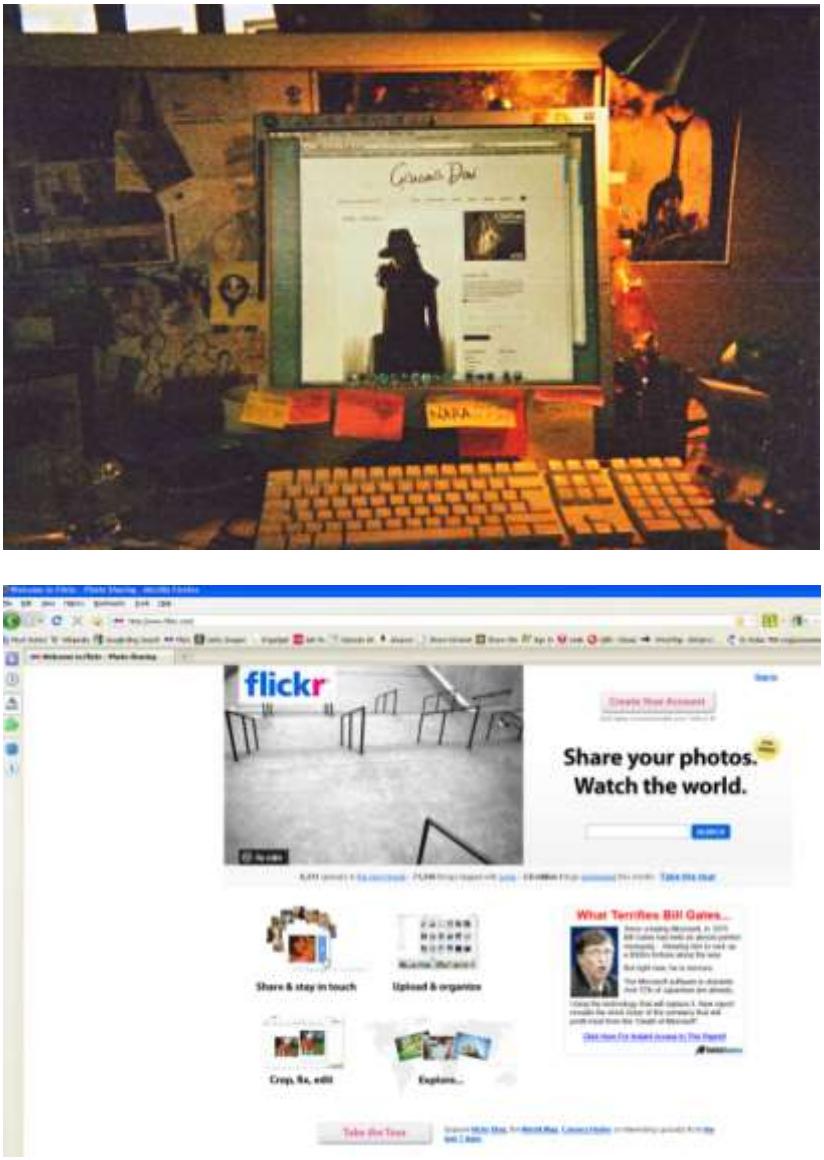


Figure 4.14 - Examples of 'website(s) you reference most often'

Other prompts were posed to gain insights into preferred tools, equipment and attitudes, such as 'tools you use when designing' (Figure 4.15) and 'something that represents ergonomics' (Figure 4.16).

Figure 4.15 - Example of ‘tool(s) you use when designing’

Figure 4.16 - Examples of ‘something that represents ergonomics’

4.5 Probe discussion and summary

The probes helped create a rich collection of insights about the participants. The participants were influenced by the probes to consider the themes of the research, and the researcher was provided with a range of detailed perspectives of the participants' day-to-day design practice. Although a lengthy process from initial recruitment, through construction, distribution and return, the probes provided a range of data and insights that would have otherwise been impossible to gather.

The use of probes was a prolonged exercise, the trend tending to be the longer the respondents delayed in completing the probe tasks the more of a burden completion was considered, and although the task should only have taken each designer approximately 30 minutes, this appeared to be considered undesirable interruption to commercial work, which was naturally their priority for obvious reasons. In hindsight if the probes were not returned within one month, it would have been more appropriate to distribute kits to alternative participants. In cases where participants could be selected with less narrow selection criteria (i.e. in this case experience of inclusive design) it would be appropriate to be more pressing, and where response was slow to recruit additional respondents. As inclusive design practitioners are less prevalent, it was necessary to be particularly flexible with participants due to the difficulty in recruiting and the limited alternatives.

The data collected helped inform the questions used in the follow-up interviews and the images returned were useful in providing insights into the various studio environments and contents prior to visiting them.

The probe exercise provided many qualitative insights into designers as individuals, through a collection of sketched user-centred mappings of their design processes, insights into how they alter their process to design for different people, how they categorise their individual thinking processes, and some more quantitative information which helped prioritise information traits that could be included in tool concepts. Importantly the probes also introduced

the work and created communication channels to user-centred designers, which allowed further consultation and follow-up interviews.

4.6 Interviews

Questions based upon initial themes (Table 4.5) pertaining to the subjects of the thesis, key research questions and recurrent subjects of significance identified through the purposively selected texts within the literature analysis, informed the development of a semi-structured interview outline (see Appendix B). Additionally the material generated from the probes was studied, with any peculiarities (e.g. resources mentioned that were unfamiliar to the researcher) within the probe responses were noted for further exploration, as the same participants involved in the probe study were also those being interviewed.

Table 4.5 - Interview themes

No	Themes
1	The design process
2	Understanding users
3	Designers' cultural references
4	Inclusive design
5	Diversity-centred design
6	Design ethnography
7	Human information
8	Information and empathy
9	Recording
10	Reflecting
11	Tools and resources
12	Access to information

The interviews were carried out over a period of two months, and in many cases were only secured after several reminders. All interviews were carried out in person with the exception of three participants who were unavailable. Alternative arrangements were made for these participants, with one being interviewed over Skype and the other two being provided with the semi-

structured interview outline used by the researcher, allowing the participants to treat the outline as a questionnaire and respond in writing at their convenience.

Interviews explored the issues further informed by the probes. The probes went some way towards capturing the desired input from participants, which the researcher collected and reviewed prior to the interviews arranged to take place within the designers' studios.

4.6.1 Interview setup

Before the probes were distributed participants were informed participation would include a later follow-up interview. The interviews were conducted in the participant's studio environments, having been arranged over a period of one month once all probes were returned and examined and the camera films developed. The use of the probe gave participants a medium to convey their opinions and practices through written words, drawings and photographs; however, they were open to interpretation; hence, the interviews assisted in the clarification and development upon participants' responses to the probe.

The interviews were semi-structured and based around the themes identified through literature analysis and examination of the returned probes. The objectives of the interviews were to explore themes relating to human information use in more depth and in situ. The interviews were recorded as aiff (audio interchange file format) using a digital recorder and later converted into mp3 and fully transcribed (see Appendix C for sample). Field notes were also taken during the interview against a loose template for the semi-structured interview.

Each interview lasted between 1-2.5 hours, depending upon how much depth and time the interviewees were happy to give. Each hour of interview took approximately six hours to transcribe word-for-word.

4.6.2 Interview process

Following the probe studies, which borrowed from approaches established in the social sciences, a relaxed tone was maintained through the interviews to continue to generate responses that were an accurate reflection of the designer's day-to-day work methods and practices. In this respect the interviews could be considered a form of ethnography (Frascara, 1997). Interviews were carried out with all participants; these were semi-structured in-depth interviews with individual participants. A conversational approach taken was used to obtain insights into the processes, information habits and environments of the designers; the qualitative data collection within the designer's studio environments allowed an understanding of the respondent's 'life-world' (Bauer and Gaskell, 2007). This generated large quantities of contextual information about each participant. The framework used to guide the enquiries was based around the themes of the thesis identified in the literature analysis (i.e. supporting people-centred design through information and empathy - see Chapter 2). The structure of the interviews was based around logical and progressive topic headings, and a number of questions under each. However, these were only used when appropriate, in order that the interviewees led the discussion where possible and divulged information freely and at length (Bauer and Gaskill, 2007), in order to get a range of individual insights and opinions on the topics.

Before commencing the interview a loose discussion based around the area of human information in the design process took place. Next the returned probes were shown to the participants to remind them of their answers and discussion about interesting or indeterminate responses commenced, encouraging a conversational tone, but ensuring all topic areas of interest were included. A degree of flexibility was intended to allow participants to elaborate upon issues they felt important. However, a loose structure of 50 questions (see Appendix B) was in place to ensure useful conversation was conducted. The topics this structure focused upon being derived from the identified themes (Table 4.5).

The following are examples of some of the questions posed –

> In a new project if you were trying to establish user needs, where would you look first?
>
> What people-related information sources do you refer to or collect from in a typical design project?
>
> Do you ever write-up or reflect upon your design findings and outcomes, and if so how do you do this?

The questions were altered and interspersed throughout the interviews, allowing the participants to do most of the talking and lead the conversation as far as possible. Ten interviews were carried out, each lasting an average of 90 minutes, which gave a good spread of opinion and contextual insights relevant to the study, and an appropriate range of viewpoints.

4.7 Process of content analysis

The large quantity of qualitative data produced from the interview transcripts was analysed through gathering, interpretation and reporting (LeCompte and Preissle-Goetz, 1994). The individual interviews were transcribed completely, word-for-word, generating 10 transcriptions of up to 10,000 words each. This process allowed re-familiarisation with and immersion in the interview material and initial overall impressions to be labelled and annotated. Once fully transcribed the interviews were re-read in order to identify and highlight themes and consistencies, which was carried out by hand due to the relatively small number of participants. The transcription required a process of distilling in order to inform the research, which was achieved through 'reduction' and 'display' (Harper, 2003). The reduction process was a sense-making process that involved colour coding the text by themes, followed by a process of clustering and summarising. The themes identified were presented and discussed with a colleague throughout the coding process to ensure a level of validity, as well as comparison with earlier transcripts and corroboration of the rationality of the themes, consistencies and meanings.

Analysis was carried out on the gathered data through three main activities of data reduction, data display and drawing conclusions (Figure 4.17) (Miles and Hubberman, 1994).

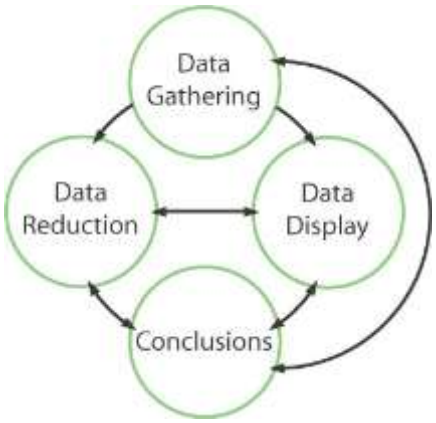


Figure 4.17 - Processing the interview data (adapted from Miles and Huberman, 1994)

The reduction involved a process of examination, comparison and subjective interpretation (Zhang and Wildemuth, 2009) through systematic coding and identification of themes (Hsieh and Shannon, 2005), reducing the bulk of data and drawing out consistencies and meanings (Patton, 2002). This process was largely inductive; however, the participants selected and the areas being explored filtered the majority of material generated into the areas of interest to this thesis; hence, the approach was directed (Hseih and Shannon, 2005). The coding started with some pre-identified themes, prior to immersion in the data to allow further themes to emerge and extend the hypothesis that information and empathy related resources can support people-centred design, and that supporting these practices can produce people-centred outputs. There was also some summative content analysis to confirm the intended topics of focus were indeed those that emerged through conversation.

Count frequencies were used for broad analysis to conduct enumeration (Goetz and LeCompte, 1984); however, results from this were only considered as broad indicators of subjects upon which conversation focused, and not indicators of relative importance, the overall impression gained from the full discussions were considered as a whole.

The process that followed can be generalised into the following steps as outlined in Zhang and Wildemuth (2009) (see Figure 4.18).

This process consisted of:

- Preparation of the data, through a full literal transcription of recordings, to transform the interview data in to a more readily analysed format.
- Definition of the units of analysis through selection of themes or expressions of ideas (Minichiello *et al.*, 1990), which could be captured in words, phrases or paragraphs of speech.

- The development of the categories and coding scheme. A preliminary model was in place from which initial categories were derived, which was modified and refined through the course of the analysis (Miles and Huberman, 1994).

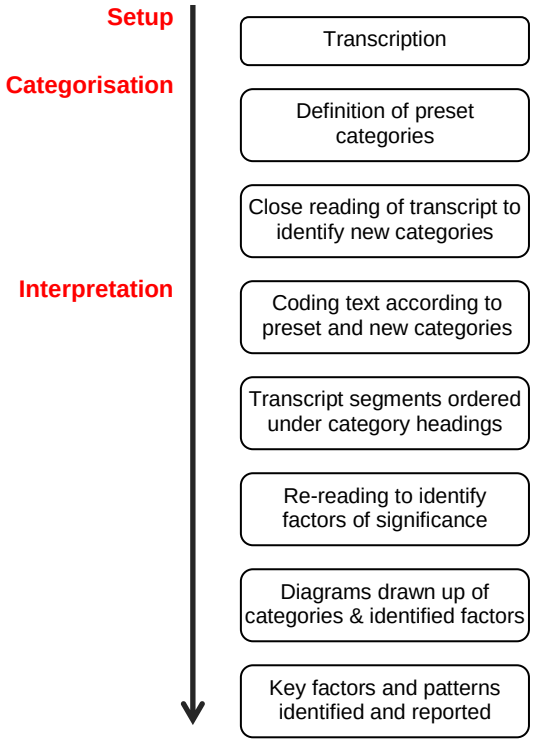


Figure 4.18 – Analysis steps

Frequently several themes were referenced within a single comment, which led to assigning units of text to multiple categories simultaneously (Tesch, 1990). Also as the text was coded new themes emerged, which were then added to the coding scheme and previously processed texts updated with the new codes.

Finally the methods and findings were detailed, recording the analytical process for future reference and possible replication (Patton, 2002) and to inform the thesis and further studies within it. The findings were presented in a balanced way, a combination of both rich description (Denzin, 1989) and interpretation (Patton, 2002) to communicate the researcher's understanding of the phenomenon under study and clarify the current and potential role of

information and empathy in the design process. Representative quotations were used to support conclusions (Schilling, 2006).

4.8 Findings Categorised in Themes

A focused analysis was then carried out with preset categories in place relative to the thesis, organising the data into groups based on topic themes of, 'people-centred design' (P), 'design process' (D), 'information' (I), 'empathy' (E), and 'support resources' (S), as the analysis proceeded additional categories of barriers (B), 'going further' (G), considerations (C), and 'opportunities' (O) were added to the analysis.

The categories were defined as follows-

People-centred design (P) – dialogue with design for people as a key driver

Design process (D) – dialogue centred around process

Information (I) – dialogue relating to materials to inform design

Empathy (E) – dialogue relating to a deeper understanding of end users

Support resources (S) – dialogue focussing on user-based resources

Barriers (B) – dialogue highlighting barriers to human information in design

Considerations (C) – issues flagged worth consideration as a whole

Opportunities (O) – dialogue that offered insight into potential opportunities

The interviews intended to explore the participant's people-related information behaviour within their design practices, hence were dominated by the topics of 'information' and 'design process', the participant's comments touching upon these areas 265 and 116 times respectively. The next most frequent conversation topics were 'barriers' and 'opportunities', being closely interlinked, at 114 and 94 respectively. Next was the area of 'empathy' and 'support resources', at 72 and 76 respectively. A full table indicating the themes and number of occurrences can be found in the Appendix D.

Each of these themes was colour coded and the text was analysed highlighting pertinent quotes/statements relative to these topics, and deemed to be of

significant value to the analysis. As the data was organised patterns and connections emerged in the data, and these were assessed for relative importance. A general estimation of importance was established through a count of the number of separate times each theme emerged in discussion (i.e. summative content analysis), and was further adjudged by the researcher through considering the overall content of the discussions, and the natural focus that emerged due to the subjects deliberately being explored (i.e. information use within the design process).

The occurrences of the themes from the participant responses are shown in Figure 4.19 –

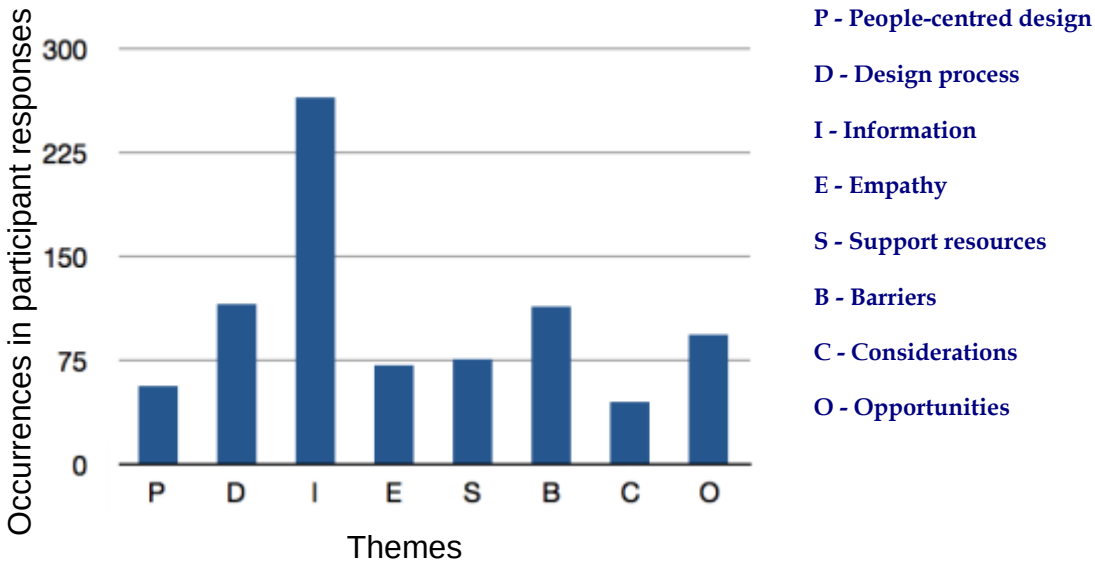


Figure 4.19 – Occurrences of theme in participant responses

Connections were also drawn out, which went someway towards explaining the reasons for certain behaviours; however, these were treated with caution and not simplified into definitive cause and effect interpretations. Interpretation of the interviews was achieved by firstly listing key points, then drawing out major lessons from the interviews, backed up by direct quotes, and explanations as to why these quotes were considered particularly relevant.

Some of these themes were further divided in sub-categories within the themes. As the data was organised patterns and connections emerged in the

data, and these were assessed for relative importance. A general estimation of importance was established through a count of the number of times each theme emerged in discussion, but was further adjudged by the researcher through considering the overall content of the discussions.

The following section summarises the findings under each category.

4.8.1 People-centred design

Interviewees discussed their relationship and level of people-centred design at length. There was a broad spread of engagement of people-centred approaches, some designers treating it as a key element of their process whilst others treating it as something largely out with their current remit. All however considered it as valuable, those who felt their process lacked this element believed this was an element of their process that could be improved.

Self-perpetuating limitations - designers believed once they had built a reputation in one area it was hard to break into others. Hence, their established expertise and knowledge was often limited to particular segments, which they had a good understanding of and access to. This would be a factor in winning projects, based on established expertise of design in particular areas. However, if 'people-centred' approaches were not recurring elements in their work they felt it was difficult to convince clients to hire them for such projects.

Testing with people - testing concepts with people was an element in every designer interviewed. However, the 'people' undertaking the testing were dependent upon access and time, and frequently were those close at hand rather than unbiased general public, or the 'right' people from target audience/market. The opinion on this was mixed, some believed if the features being tested were general enough then anyone could be representative to test; others believed such an approach was flawed but efficient.

Empathy over 'hard' data - the interviewees described the process of understanding the people they were designing for as empathy driven over fact driven, desiring to know about the experiences of individuals and understanding

their ‘mindsets’. Similarly they sought contexts and genuine spaces relevant to the people they were designing for.

4.8.2 Design process

The emerging themes identified as the study progressed showed a great deal of commonality between participants, and led to confidence in understanding of the current role of information and empathy in the design process.

Brief-driven versus innovation-driven - two variations on process were reported, in which the role of the user could be entirely different. The first was that of ‘innovation-driven’ design process, where a brief would be open and the designer would try and generate new ideas around product categories and similar. In this mode designers sought user based insight, and wanted to watch people and identify issues. The other was ‘brief-driven’ where clients might have specific product categories of concepts in mind, and it is the designer’s role to realize these. In the former the process depends more on user insight, it was considered more “haphazard” but “how new ideas come about”.

Access to users - within their design processes access to users was a major issue. Many turned to outside support in terms of human factors consultancies, where specific user groups were required. Each spoke of the immediacy of the people in their surroundings and the difficulty in accessing external users, and how this although not ideal, often forced their hand in terms of with whom they would carry out testing and ‘bouncing’. This tied into the concept of when users were needed, with designers stating it was “nice” to have user input at the early stages, but “important” to have people in place for testing, the interaction being for markedly different purposes.

Time constraints and quick methods - a common issue was that of time constraints; this often led to quick methods being adopted, such as consulting ‘like’ products to inform the dimensions of design concepts. Their approaches often started broadly with immediate surroundings and colleagues, before internet searches to find broad information and representative groups, and

then if possible focused down towards the testing stages, when individuals would leave feedback on what has been developed.

Designing above recording - the interviewees stated that process although clearly valuable was not the focus of attention in most projects. Clients expect designers to be creating design work, the interviewed designers explained, hence the process of research towards the end goal was often not emphasized (some medical product clients being the exception) and they were not given to documenting or recording this in any meaningful way. Related to this, designers often felt there was no system in place to record their process in structured ways although this would clearly be valuable, one participant stating - "there is no value in a glossy image", to highlight why he believes that 'portfolio' style images do not give any indication of the process and thinking behind the design. Several of the designers explained although not asked to deliver this, they often deliver reports on the research process, as it allowed them to evidence ideas and expel their research, before it became lost in a project folder.

4.8.3 Information

Information was the most extensively covered category around which most of the conversations were based. Although there were a great variety of information practices reported by the designers, there were many re-occurring topics, which the following section will highlight.

Lack of anthropometrics - There is a definite lack of use of anthropometrics. Those who do use them tend to do so quickly and largely to obtain 'limits' (i.e. highest and lowest applicable percentiles). The information sourced tends to be internet-based, and there is a limited trust and reliance on such data. There were some designers that used well known publications such as those written by Stephen Pheasant (Pheasant, 2003) and Alvin Tilley (Tilley, 1993), one interviewee reported consulting the DTI publications 'Adultdata' (Peebles and Norris, 1998), and one reported having used the software 'Peoplesize' but asserted that they found it very ineffective. Anthropometrics had very limited use and tended to only be used as a rough starting point, always a supplement

to testing which was the most relied upon approach to obtain user information, such as sizes.

Evidence - Information was quoted in many cases as a form of evidence to justify decision to the client. In order to communicate stories of design decision-making, images, video, anecdotes and comments could be used.

Priming - There was a desire for information to allow an informed start point from which users could be consulted in more effective ways, which would allow the best information to be later obtained through identifying the right people and the right questions.

Bouncing - the concept of quickly testing ideas with colleagues and those within the designer's environments was common across all the interviewees. The immediacy of people was a huge draw for quickly testing ideas or prototypes, although acknowledged as a flawed approach, it was none-the-less frequently cited as a way to obtain test information.

Client insight - clients played a large role in the designers' information practices. This was particularly true of those within the medical domain, who tended to think their clients had an appreciation of the value of user based information, and could often provide valuable experience and insight. However, there were various references to it being excessive and often using jargon. Additionally clients would often encourage human factors consultation. This was met with mixed opinion; some felt it to have value when the information was presented in a more design sensitive manner, whereas other designers felt it at times was biased and inappropriate.

Day-to-day insights - meeting the users to obtain information, insight and inspiration was the ideal for most candidates. However, it was acknowledged that this was frequently difficult to arrange or access, and so they would "take what they could get". Frequently the desire was for insights of diverse people and their day-to-day lives, within natural contexts, from which the designers could draw their own insights and conclusions.

Stockpiling - all designers kept past project based material; however, this was frequently 'archived', and would take some effort to access, either taking time to go through project folders or consulting colleagues who might have a better knowledge of the previous project.

Internet - the Internet was without doubt the most utilized information source, and many of the interviewees revealed they rarely reference books. In keeping with this trend, much of the information they used was in a digital format, and analogous usage patterns were apparent, from the desire to quickly access information, to the preference for information that was instant; could be browsed and tagged, and was visual and visible.

4.8.4 Empathy

Seeing it for yourself early in the process - the designers preferred where possible to see the people, in context, in order to draw their own conclusions - "you can't extract that kind of data out of the charts – you need to go and see." There was a desire to understand people and their lives early in the process, as it can "give you a hundred different ideas."

The little details - the designers sought diversity, and the "right people" and they wanted to know details and differences, the usual and unusual of these people's experiences, in order that they could "get a good impression of what the person is like." From this they could extrapolate details, one designer even spoke of having a "mental bank of users" to "pit the design against".

Real over constructed - there were frustrations with biased approaches to representing user types, such as personas, which the designers felt were often "contrived" and "constructed" preferring to use real people. This brought up the contentious issue of being "close enough", where using themselves, colleagues or other more readily available people might be considered a near enough approximation of the end user. This approach was limited, and acknowledged as such, "everyone sees things through different lenses", the

limitations were felt to be greatest in unfamiliar domains where understanding the situation was trickier.

4.8.5 Support resources

Expert support - although not always available to projects (generally budget is only made available by bigger clients), all designers mentioned the benefits of using outside experts to assist them in understanding end users, whether this was through hiring human factors agencies, relying on the clients experience and knowledge or finding experts or advocacy groups that represented groups of users they were interested in. One designer spoke at length about the limitation of being supplied with "tons of stuff" but went on to highlight a single case where they hired a design-focused user insight group, and highly praised the benefits of having design-sensitive information collected and delivered to them "… that was good, they presented it really cool, and we could work off it, because it's easier sometimes for someone else to be doing it and get the information out, and you can just work off it".

Supporting storytelling - the interviewees spoke of the benefit of images and anecdotes to tell stories, as a way of justifying decisions and reporting back to clients and buyers "to understand the problem and what solves it."

The limitations of conventional support resources - all designers believed existing anthropometric support resources were not sufficient to base design on. They occasionally used such charts for limits, or if it was a difficult to access group (e.g. children, pregnant women), however, the value of the information was considered very limited "I found something, it was pregnant women in the military, from the early 90's, how limited is that going to be." One of the designers had previously used 'Peoplesize' software but again felt this was limited "… it wasn't very good; it was a pain".

Visual based support - Images were the most common source of information designers sought, used and stored, many considering this an obvious preference, one participant stating "visual, graphic of course! I'm a designer!"

Video was also considered of high value, the reasons given for why it was used less often than images were a combination of time, skill and file-size, but a great potential was seen in the medium, one designer stating “we would revisit video more often, but video is just so time-consuming.”

Digital/Internet prevalence - A variety of digital and internet resources were frequently cited, such as ‘freemind’, blogs, ‘netvibes’, ‘twitter’, ‘getty’, ‘delicious’, ‘diggo’. As far as any form of resource for project storage was concerned the majority stated digital folders on hard-drives where everything related to a projects would be “dumped” - “the project folder, which literally things just get dumped into and probably never looked at again.“ One interviewee who was uniquely conscious in regards to storage of previous project material stated “we’re pretty good at cataloguing, just through aperture (mac based image sorter), and organizing things by project.”

4.8.6 Barriers

The categories of barriers emerged during analysis. They were considered in parallel during analysis as the barrier statements often highlighted existing limitations, which in turn could frequently be considered future opportunities for improvements.

The main barriers to the use of human information within their design processes as described by the participants are summarised as follows.

Designers predominantly feel there is little need for anthropometrics data in their process, feeling it has little value in product design development beyond quickly gauging limits for the general populace. The anthropometric-related resources they tend to consult are largely obtained as needed through internet searches. Books are rarely used, the exceptions being three of the interviewees that gave examples of trusted publications they own and consult at times (i.e. Bodyspace; Adultdata; Humanscale). The preference in all cases was to measure and experiment with real people, which would allow them to measure specific things quickly, this often being self-testing (i.e. measuring their own body parts)

considering themselves as the user, or using colleagues/people close at hand due to immediacy issues in terms of both access and time.

The designers were interested in qualitative information, which they could quickly get an overview from, and "dip into" as needed, particularly in the early stages of the process. They often felt they were "overloaded" with hard data at times, and preferred a mixture of visual information; however, they were wary of the time required to make best use of video resources.

The designers explained that large quantities of mixed media material were collected during design projects, but tended to be left unorganised and placed in general project-based folders, and were rarely re-visited. Time-dependant deadlines, and clients that focus upon end deliverables over process, were a large factor in this. Designers stated that the value of research was not understood nor appreciated by many clients, the exception tending to be those within the medical domain. Another significant barrier was that no structures were in place for useful recording, and they felt that project-based insights could be difficult to generalize or re-use elsewhere, so tended to generate new research for every project.

4.8.7 Opportunities - Representation, Retrieval, Organisation and Reflection

The majority of designers believed that value could be added to their process, through resource development sensitive to their needs.

Representation could be improved in numerous ways, several designers spoke of the research delivered to them by clients or similar as being of little value because there is a gap between what 'researchers' gather and what the 'designers' need, such as context and inspiration. Anthropometrics in particular were considered limited. One participant commented "the research people do a really good job of doing the research and they hand it over and go 'there's your research', and it doesn't really translate." There was a desire to literally 'see' information that can give genuine and detailed insight into the everyday lives of diverse groups of people and their environments, from comments and informal

chats to mixed media representation, using both video and photographs, with digital formats repeatedly highlighted. The dominant mode of information representation currently used and desired was through the medium of the Internet – “we all use it, everybody does”.

Where retrieval was concerned the designers highlighted opportunities and needs in preparing or ‘priming’ with user information in order that they could tackle design problems more effectively. They thought this kind of information could be particularly useful in the early stages of the development process, to inspire and inform, which is exactly when getting such insights can prove difficult. They also sought new user groups and diversity, being both wary of their conventional use of colleagues “I admit it's not a great source of information, but it's quite a good first bounce,” and of users that are brought in repeatedly “even these recruitment companies use the same people.” Related to this they spoke of conventional methods such as benchmarking, and at times seeking information from clients, experts and human factors groups. Again the Internet was a prevalent topic within this theme.

The organisation of information was a significant factor, every designer followed a similar process of fast collection and assimilation but the process and the materials used in decision making were haphazardly “dumped” into project folders, in ways that were difficult to access and meant they would struggle to directly draw from or even have a good overview of the stockpiled contents – “you tend to just look at the top level or it gets confusing.” There was no designer that collected user details specifically; these details would be mixed in with generic information relating to the project. One designer commented “I don't have a folder that has like previous users in it, but that might be quite fun.” Most designers depended upon their mental recall or that of colleagues of individual projects, rather than attempt to locate or revisit the material within a project folder. Related to this, a desire for some form of labelling and storing convention was evident, with most of the designers mentioning the benefits of such systems within web resources they use, such as labelling, tabs, tags, aggregators, etc. yet no such system within their project work - “we don't have

an employee manual, like an operations manual or anything for our company, but if we did it should outline naming conventions for files and exactly what type of files go where on the server structure."

Reflection as a term was perceived as suggesting an extended period of time is required, which participants indicated was not something professional design development typically allows opportunity for – "there's not often time to reflect on previous reports". Hence rather than an extended digestion of variables designers were more interested in immersion and evidencing or a more rapid reflection, one designer commented - "I don't set time aside to do it (reflect). If something relevant from a previous projects occurs to me, then it occurs to me as I'm doing it". Reflection was frequently based upon such an internalised process and mental storage of users to "bounce" ideas with, as highlighted in the comment "a thing I try to do is try and be more observant about people I meet and talk to and try and store those away, but it's never written down", they further elaborated "I'll think oh yeah didn't we do this in a previous project, and then I might think about it or go back and dig up some images". Some designers also commented that they reflect on previous project successes to inform future projects, but not in a structured way.

4.8.8 Considerations

These were drawn out as they highlighted general issues for consideration for this research. They tended to highlight approaches to design and thinking that might compromise people-centred approaches and the use of human information resources, regardless of the benefit or how well it might be executed.

The first of these considerations was related to serendipitous element of the design process and the logic that if the focus was so fixed other elements within the users' space might be missed, and hence opportunities to innovate might also be missed - "if you were so consumed by getting the answer to how a kid is carrying their bags, portrait or landscape, or whatever else, you might not be

open to noticing that someone is doing something really interesting and you might miss an opening for a whole new product or a whole new way."

The client represents a huge factor in designer's considerations. The first consideration highlighted was that concept work can be "fluffy" or under-defined, hence clients are reluctant to pay for it, and it is streamlined as far as possible. The next was that clients consider people to be "not so much users as consumers" and are not interested in things being designed for the benefit of the user, but more the increase in sales. This point was emphasized by one designer that explained a project at length, describing the large amount of quality use insight that was gathered, only to be dismissed by the CEO of the client company. They concluded "designers are interested in the qualitative stuff, but maybe the people making decisions just want to know the facts."

A further issue was balance and depth, designers would like to know more about users, and do not want to base decisions on small samples; however they "tend to just look at the top level, or it gets confusing." Hence the suggestion is that a balance must be struck with any resource; it has to have enough top-level detail to allow a complete overview, without being too detailed, to avoid confusion but allow more depth to be obtained, as and when desired. Related to this many of the designers demonstrated concern with older information "the Dutch are getting taller year on year, so if you're a year out you know, you might be completely wrong," which flags up the need for regular updating, how to manage this and when does it become saturated – "there's just too much stuff. So I flick through a few things, and think that's interesting, then that's interesting too, that's interesting, and then I just think oh forget it, there's too much".

Another issue was that different forms of benchmarking and references to existing products make up a huge part of the designers information repertoire. Many designers have established work methods and are unlikely to be convinced to do otherwise. One designer commented - "I never take measurements of people, it would be more what works. If it's on a lot of

products, then it works," showing a belief in the authority of what is already on the market above any user research. Similarly another designer spoke about being in a mature industry where there is not much left to learn, highlighting this when talking about moving into the children's furniture – "we are just scaling down a chair."

4.9 Discussion

The interviews further developed upon the probe findings and the first main research stream - use of human information in design. These interviews facilitated face-to-face interaction, direct observation of work environment and non-formal conversation to further develop upon the themes.

The interviews allowed the researcher to gain broad insights into information use, value and habits from the perspective of the designers. The findings of the qualitative research helped in establishing overarching themes influencing information collection and delivery within design practice, from which a framework was drawn consisting of the elements of representation, retrieval, organisation and reflection.

The statements from the designers generated confidence in the hypothesis that a resource to collate human information and make it accessible could have great value to designers. The following section presents examples of key statements relevant to several of the themes, in order to give an impression of the interview data and the complexity of the analysis.

The letters used in coding represented the following themes 'people-centred design' (P), 'design process' (D), 'information' (I), 'empathy' (E), and 'support resources' (S); as the analysis proceeded the categories of barriers (B), 'issues of concern' (C), 'reflection' (R) and 'opportunities' (O) were added.

The following examples highlight some key quotes and themes coded within the statements.

"A lot of the time though, you're too busy. You're developing stuff and you're getting input **(I)**, you're not necessarily recording as you go along, you're too busy developing it to record everything **(B)**, if that's not something the client has said **(C)**. You should, but you often only document the end product and not the process **(D)**." Participant 5 - (I, B, C, D)

“I think I like to see a mix, because when you're just looking at text based things you always wonder if it’s lying or not, or if it’s been skewed in some way **(C)**, especially if there’s statistics **(S)**, and only by actually witnessing something can you confirm whether or not you can trust it **(B)**. So a good mix I think is better, it just feels like a more trust-worthy base, and it gives you greater options in communicating your point should you need to dive that deep into the source information **(I)** for that client, to show them why you’ve made a decision **(D)**. To be able to base it on evidence is more powerful **(O)**.” Participant 8 - (C, S, B, I, D, O)

“It’s quite hard doing the design **(D)** and the user research at the same time **(B)**, it’s helpful if they (design research consultancies) pass the information on **(S)**, so you can still think about it but it’s more concise **(O)**, because it's quite a lot of work to get the right information **(I)** out of someone, you have to sift through information all the time and you get overloaded **(C)**, you can't think.” Participant 3 - (D, B, S, O, I, C)

These quotes highlight the complexity of the subject of human information use in the design process and inter-connectedness of the issues. Information was a dominant topic, and was hence further coded to draw out the most frequently described factors and map them under headings for clarity. The headings used being - ‘representation’, ‘retrieval’, ‘organisation’ and ‘reflection’ (Figure 4.20). These headings represent recurrent critical components drawn from the interviews in relation to human information use, and were a useful starting point for establishing an information framework to further develop through tool concepts.

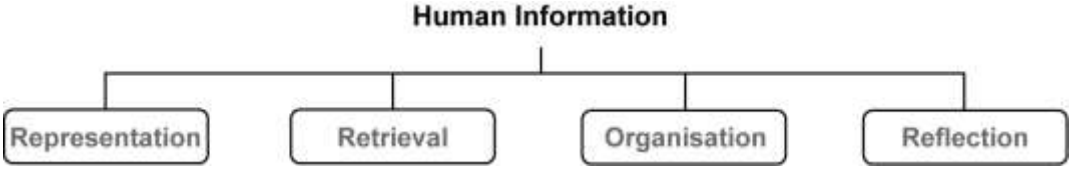


Figure 4.20 – Derived human information framework

4.10 Summary

The interviews identified that the use of anthropometric data sources by designers is very limited, with experienced designers relying largely on experimental methods such as physical prototyping and engagement with people. An issue of concern was the very limited breadth in the user groups consulted, particularly when time or money constraints were strong, in which case there was a clear dependency upon subjective colleagues within immediate environments for trialling ideas and testing prototypes.

The materials collected revealed that throughout the design process designers gather a variety of information in numerous ways, largely on an 'as needed' basis for each new project they undertake. When initial briefs are set there can be accompanying material (at times supplied by the client group) relating to the subject area and/or design needs; this information typically forms part of an early collection of internal research from within the design company. The level of detail can vary greatly; however, repeatedly designers stated a large proportion of design thinking material is not physically tangible, but derived from 'intuition' or prior experience. There was a tendency to remain within areas of expertise where designers felt comfortable with much of the assumptions they made, and might develop upon previous knowledge. This prevalence of designers' utilizing prior knowledge is the norm; unless the project is unique enough that they must engage with new scenarios, users and data. This is not to say that it is an incorrect way to tackle design problems, it is a classic scenario found across most disciplines; with more experienced people become increasingly useful commodities.

Designers prefer to engage in experimental methods (e.g. prototypes and test rigs) and interrogate these themselves or by working with users (although often no more than colleagues) when physical embodiments have been created.

A clear attitude from participants was that although they were aware of books and other data sources relating to ergonomics and particularly anthropometrics, there is a clear reliance on intuition and ad-hoc measurement. Unlike the design

outputs, the specific development details of previous projects were difficult to access, hence it was unlikely that findings from previous projects would be considered, unless they were directly experienced and recalled by a designer within the team. The likelihood of re-exploring previous projects in any depth was low, as they tended to be dumped in no organized manner, and hence creating new data was seen as more efficient.

A key component of the findings of the probe and interview study was the identification of a framework for human information (i.e. representation, retrieval, organisation and reflection), expressed in the following sequence of questions -

Who and what require representation?

Where can the necessary human information be retrieved?

How can this human information be organised?

How can reflection upon the information be facilitated?

This framework formed the basis of further exploration in the next chapter dealing with real life case studies.

Chapter 5. Case studies: Contributing to designers' human information approaches

Having identified the value of human information in the design process through the background theory in the literature analysis of Chapter 2, and having used probes and interviews in Chapter 4 to further define some of the current approaches towards human information and to identify the potential significance of four themes (i.e. representation, retrieval, organisation and reflection); the researcher then took the role of a participant observer in two 'real-life' projects. The goal of these studies was to investigate how one might deliver human information that meets the needs of designers in live projects (i.e. real world applicability); exploring the ways in which the representation, retrieval, organisation and reflection of information and empathy resources could contribute to their approaches in complementary ways and bring genuine value to their process. The intent was to identify what the qualities of practical human information for the design process were and how they could be effectively delivered within the limitations imposed by a commercial setting and timescale. In effect the studies hoped to uncover any explanations, relationships or generalisations (and their limits) that could be made about designers' human information use and need; towards understanding what questions designers require answers to, and how these answers might be presented in a variety of ways, to allow an insight into the perceived value.

This chapter consists of two case studies 'A' and 'B' where the researcher's focus was upon the impact of human information delivery at early phases in the design process (i.e. generation of a brief and briefing materials; 'exploratory' phase of design development). Study A was given the working title of 'Safe Ways In Glass' (SWIG), and it involved the examination of human information delivery to inform design prior to development; study B was given the working title of 'Design Bugs Out' (DBO) and involved the examination of human information delivery during early stages of design development (i.e. 'discover' and 'define').

5.1 Case study A (SWIG): human information delivery prior to design

A participant-observer perspective was obtained in this commercial development project through undertaking the role of a lead researcher within a research and development unit based at the Royal College of Art (i.e. 'InnovationRCA'). The SWIG project was commissioned by the Home Office and the Design Council as part of the Design and Technology Alliance's 'Designing Out Crime' initiative, the intention being to tackle the problem of alcohol-related violence in the UK with focus upon drinking vessels and their potential to be used as weapons.

There are many established approaches to understanding complex socio-cultural issues within the fields of social sciences. However, designers' understanding of such issues can benefit the design process particularly from knowledge of physical, cognitive and emotional concerns. Two critical limitations typically exist within commercial design projects: skill and time. These limitations frequently cause designers to rely heavily upon what little information is available to them beyond their own experience and tacit knowledge, often in the form of materials delivered to them by the client such as a briefing document and accompanying materials. A typical characteristic of such resources being users represented as abridged abstractions of 'typical' consumers (Desmet *et al.*, 2001). To overcome these issues the study looked to capture a variety of rich and textured data and compile it in ways that could communicate the problem and stakeholder needs to designers. The goal being: to present users in a raw and natural format, replicating direct contact as closely as possible. Towards a deeper understanding of this complex issue and the potential for design thinking and design artefacts to have a positive impact, a core team was assembled by Innovation RCA consisting of a project leader, two designers and two researchers (one of which being the author of this thesis). The two design researchers focused on investigating the issues and key stakeholders holistically; and two designers, focused on later stages of facilitating an ideation workshop where potential design solutions and themes would be drawn out based upon the research. The research goals were to

investigate the problem holistically, in order to understand and convey key stakeholder needs, from which information resources to communicate findings to designers would be created. Findings would be communicated through the organisation of a workshop to engage representative key stakeholders in the process of identifying mutually desirable solution areas. Therefore, the researcher's role was not to establish design criteria, but instead to define the problem and supply informational materials for others to use; the primary goal became the transfer of accumulated knowledge to the designers. The researcher purposively treated the production of user information as a design process, and in doing so produced highly visual, descriptive and immersive communications; largely influenced by findings described in Chapter 4 which helped in understanding the intended audience and convincing them that the information being provided was trustworthy and of good 'quality' (Wang and Strong, 1996).

5.1.1 Context of study

There are over 25 million regular beer drinkers in the UK, 15 million of which drink within (approximately) 200,000 bars, pubs, clubs and restaurants weekly. This totals approximately 126 million pints of beer served across bars each week in the UK (British Beer and Pub Association, 2006). The vast majority of these individuals intend to relax and socialise; however, amongst these regular drinkers, two million consume alcohol at harmful levels, and around seven million drink at levels in excess of the government's health guidelines. The total annual societal cost of alcohol abuse accounts for 284,000 hospital days, almost 250,000 General Practitioner consultations, 183,000 A&E attendances and 64,000 ambulance call outs (Coomaraswamy and Shepherd, 2003). Strongly associated with these facts was the Department of Health's focus for this project – alcohol-related violence and glass related injuries. This is a serious problem in the UK, with approximately 5,500 glassing assaults reported each year, and glasses or bottles being used in 5% of all violent crime (Worthington, 2008).

The problem identified was that there were no available solutions to attract both industry and consumers to actively adopt a safer dinking vessel that could be considered the natural successor to standard glass vessels. The challenge was therefore to identify the needs of stakeholders, towards designing a range of new drinking vessel solutions that would provide motivation for active adoption and acceptance by industry and consumers alike whilst also providing improved safety.

5.1.2 Purpose of research

Alongside discussions with the client, a brief acts as an initial (and critical) information source for designers beginning a new project. However, the information within design briefs is often delivered in a compact manner; with little consistency between the content and format. Equally the accompanying reference material provided by the client can vary in quantity and quality, and is rarely communicated in a 'designerly' way. These issues were of huge interest to this study, and motivated the investigation of the potential role of human information resources prior to design development. The goal therefore was defined as the creation of a base of information from which the complex design problem could be understood and addressed by designers. This presented the unusual opportunity of gathering the necessary information for brief development, and to 'design' it in such a way as to communicate context and provide human insight, as well as identifying key themes and opportunities.

The goal of this first case study was therefore to use information and empathy findings to create comprehensive and multi-layered briefing materials to provide a well-informed starting point for designers, from which they could proceed with design development informed by the prepared human information resources.

5.1.3 Research approach

The researcher was immersed in the design problem area (i.e. alcohol-related violence) through engaging with the identified stakeholders, as the successful

adoption of any design proposals would be dependant upon their responses. The aim was not to write an academic report on the issues, but to collect and present a balanced foundation of key human information in an engaging way, identifying key themes and opportunity areas to highlight materials to be used later in workshops and briefing materials. As the research goal was essentially designing accessible information for designers, the research adopted a similar approach to a typical design development (see Chapter 2 Figure 2.3), demonstrating a familiar route in order to retain credibility with the audience and producing resources appropriate for application in a design development.

To fully understand the nature of the problem and develop key areas for development the project ran in the sequence of exploration, communication, ideation and delivery. These phases are explained in Table 5.1.

Table 5.1 - Adopted research process

Study	Stage
Exploration	Research scoping: identification of key areas of research. Research activities: literature and image review; user interviews; product and material testing; sample collection. Stakeholder engagement: identification of key industry influencers, followed by meetings to secure 'buy-in' and support.
Communication	Research analysis: prioritisation of key research insights. Workshop planning: defining format/deliverables, and planning of stimulus to allow participants to rapidly absorb research insights.
Ideation	Creative workshop: a one day workshop aimed at generating a wide range of ideas from all stakeholder persepectives for later evaluation. Idea evaluation - analysis and grouping of the solutions generated at the workshops, and preliminary selection of most promising.
Delivery	Delivery of documentation and multimedia resources: compiled research and workshop outputs towards brief creation and support.

Exploration

The research initially involved gathering printed material (such as academic papers, police reports, newspaper articles, publications of suppliers and drinks

trade) on the subject. From this information the recurring themes were identified, and experts relating to each theme were contacted. These stakeholders fell into the six key categories: academics; law enforcement; materials and manufacture; users; industry; and medical professionals. In order to obtain a UK based overview three cities were selected for the study, which were considered to be appropriately representative of the issues being addressed. The cities selected were: Glasgow, which imposed a glass ban in 2006 (Forsyth, 2007) for late night licensed venues; London, with a diverse multi-cultural populace, and strong night economy; and St Albans, having the largest ratio of pubs to head of population in the UK.

Communication

This phase was of particular interest to the study as it involved attempting to communicate the richness of the environment and those within it, and capturing some of the sensory stimuli (e.g. visual, aural). This was achieved to some degree by interviewing users in situ, with video, photo and audio recording devices. This material was predicted to be particularly useful to the designers as it provides contextual texture relevant to the users' world (Fulton Suri, 2003). Each interview was video recorded with a 'flip' camera; these cameras were selected as they are discreet and have an interesting point of view (similar to face-to-face), which made playback more engaging. Insights gained from the research activities led to the definition of four key insight themes: industry, environment, vessel and users. Within each theme a range of topics were identified that were felt to have a high importance and were therefore highlighted in the presentation and workshop materials throughout the day. The research team divided themes, with the researcher focussing upon the themes of 'users' (Table 5.2) and 'environment' (Table 5.3), these themes being considered of most relevance to human information and people-centred design.

Table 5.2 – User theme

USER	
Category	**Description**
Sensory experience	The major issue for users, with differences in temperature, weight, shape and optics consistently cited when the glass versus non-glass drinking experience were compared.
First impression	Initial reaction to non-glass vessels was almost exclusively negative, but many cited their previous experience of plastic as a major reason for this. Plastic was considered to be of lower 'quality' and therefore less aspirational/desirable.
Fresh appeal to new consumers	Younger consumers were more open to the potential of design to deliver a new and exciting non-glass vessel; these users also expressed preferences for branded and 'novelty' vessels.

Table 5.3 – Environment theme

ENVIRONMENT	
Category	**Description**
Context	Feedback from consumers suggested that the drinking context affected perceptions of accepted vessel material. Consumers were more accepting of non-glass vessels if the context was changed (e.g. on match days, music festivals etc.)
Enhanced Experience	Key issues raised by consumers focused on the overall drinking experience. Although the vessel played a major part in this, other aspects of the drinking environment were also important including: venue design, location, music, staff and ethos. Although consumers were happier drinking out of glass, they were also open to new materials and designs provided these delivered an improved drinking experience.
Safety	Consumers were much more accepting of non-glass vessels in situations where their safety might be compromised if glass were used (e.g. sporting events).
Bar Operations & Functionality	The functionality of the vessel was a primary concern for industry and additional complexity in bar operations will be a barrier for the trade.

5.1.4 Resources prepared and workshop

A workshop was organised in order to provoke collaborative discussion between representative stakeholders from the many standpoints within the holistic picture, and reach some level of consensus as to potential and practical solutions areas, from which a brief(s) would be created. Through the course of the research a network of interested parties and industry experts was established, from these groups invited participants were then separated into three groups comprising of a mixture of the professions (i.e. designers, materials experts, and drinks trade professionals from brand managers to bar staff.

Previous work in the field has underlined the need for the presentation of user data to be 'quick and easy to find and use, visual and stimulating, flexible and open-ended, and relate clearly and concretely to design issues' (Goodman *et al.*, 2007). At the beginning of the workshop a ten-minute documentary film, directed and narrated by the researcher and his colleague using video clips compiled through the research phase was shown to the participants (see Figure 5.1).

Figure 5.1 - 10-minute documentary style video

The film was edited to present the issues and communicate key findings. Following this the researcher and his colleague made a presentation including an introduction to interactive screen based resource boards, which communicated a variety of findings based on the insight themes (Figure 5.2 shows the theme of 'users'). These interactive resources allowed the workshop participants to explore multimedia resources, which presented information and insights about the environments and stakeholder perspectives (through video clips, images, audio, newspaper clippings etc.) that enlarged to fill the screen upon clicking the boxes within each category.

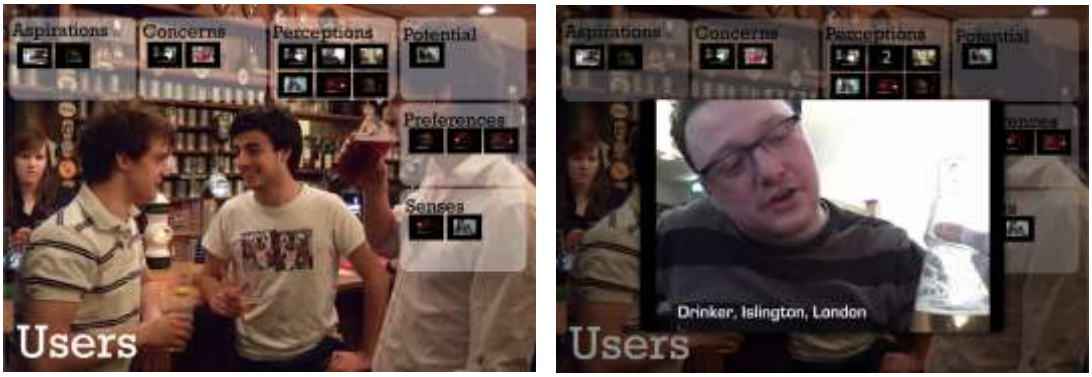


Figure 5.2 - 'Users' themed 'interactive board'

Each of the insight themes became the driver for brainstorming during separate breakout sessions in relevant spaces, which were set up to stimulate discussion. For example when considering the 'users' theme the workshop attendees were provided with pint glasses and protective clothing, so they could experience breaking a glass against a solid surface as well as get an idea of the forces and grips required to successfully break the glass. Watermelons were provided to give attendees an insight into how readily the now broken glass could slice through flesh (albeit the flesh of a fruit). Continuing on the theme, lunch was provided in a closed bar (to ensure only those attending the workshop were on the premises). This allowed the participants to fully access and explore all areas of a typical bar setting, including those they would not typically have (such as behind the bar), to inform their discussions. The bar manager was also at hand

for discussions relating to the setting. All of these settings and tasks were intended to bring the participants as close to the scenario as possible to empathise with the situation and people involved.

5.1.5 Design responses to workshop questions: key opportunities identified

Teams were initially brought to the main gathering space, before the creative sessions began. With each new session the teams would be located in separate rooms, with different stimuli to tackle one of the three key questions (Table 5.4) through discussion and brainstorming sessions. After each session everyone would return to the main space and debrief, reporting their results and conclusions before moving onto the next room/question. Finally all teams were gathered for a conclusions session, where each team presented what they believed to be their key findings and ideas from the workshop.

Table 5.4 – Three key questions

How can glass be made safer?
Consumers and industry have shown a clear preference for glass and glass vessels, in terms of inertness and the systems already in place for manufacture distribution and recycling. For consumers in particular there is a huge emphasis on the sensory experience (e.g. temperature, weight, optical clarity). Therefore, if a solution could be found that would make glass break in a safe way it would be a win/win.
How can alternative materials be made more appealing?
Research showed that there are commonly available alternative materials to glass (e.g. polycarbonate, acrylic, PET etc.); however, each has drawbacks and consumer perception of plastic is an issue of concern. If these issues could be addressed in a new design of a plastic vessel, it might be possible to offer a viable and attractive alternative to glass.
How can industry and consumers be persuaded to change?
Regardless of how good any new solution might be there will be resistance to change. Research demonstrated this has always been the case even upon the introduction of glassware to bars. Therefore, it was necessary to explore how a new product be successfully introduced and widely adopted, through unique and beneficial features.

Ideas were collected on post-its over the course of the workshop. These were grouped according to the question they addressed and the assets of the solution proposed, they were then distilled into 'key opportunity' areas under the three driving questions of the project generated based on the major research findings of the project. At this stage the two designers in the team took the lead on the project to develop design themes. The opportunities identified through the workshop were gathered into like categories from which those with seemingly most potential were plotted into a chart with axis criteria being 'feasibility' and 'appeal to trade and consumer'. They were rated on a simple scale of high to low, the outcome of which helped identify the key opportunities to be presented in the final briefing document, alongside the briefing materials produced by the researcher to reach this stage.

5.1.6 Delivery of research material

A 'key insights' publication was written by the researcher and his colleague, providing a summary of the research including key statistics, quotes, and trends, amongst other issues identified, conveying a range of insights, which was released in 2009 by the Design Council, offering the opportunity for designers to apply to be involved in 'designing the next generation pint glass', and pitch for the project. In addition to the research documents produced to support the final briefing document, a visual mapping (see Figure 5.3, with larger version in Appendix E) of the research process was constructed to communicate the journey taken, explaining and supporting the material being presented and how it was collected. This transparency of process was considered important in creating trust in the research.

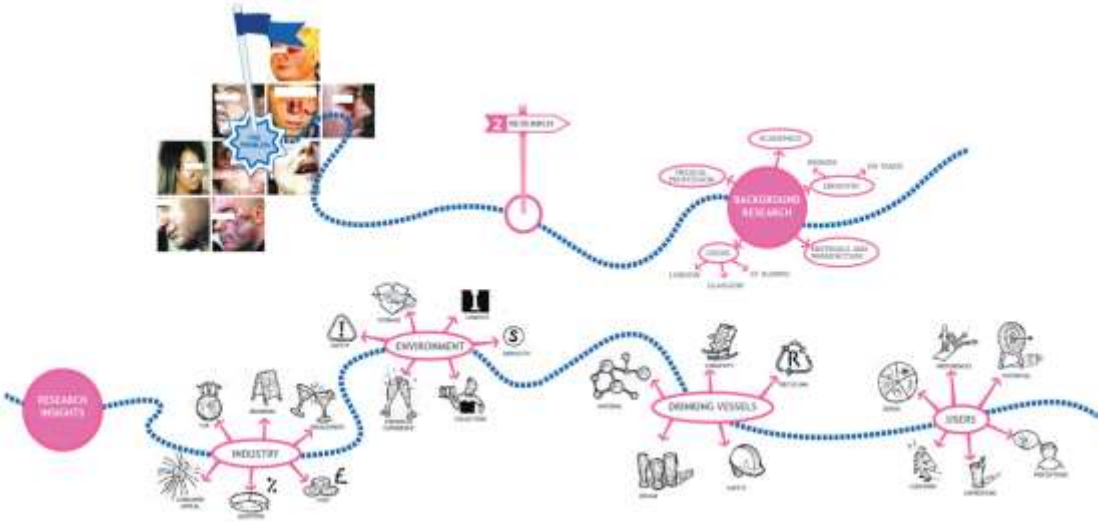


Figure 5.3 - Visual mapping of research journey

5.1.7 Use of research materials and impact on design process

A follow-up interview (full transcription can be found in Appendix F) was carried out with a member of the design consultancy that won the project, to evaluate how the briefing and research materials were received, and how they compared to the materials of a typical project. They confirmed they were unlike anything they had previously received in terms of depth and variety, which they believed positively impacted upon the project and assisted them in their goal to "connect with consumers". The designer interviewed stated that the material was given to all the designers on their team, using it as the starting point for the project, as they felt it was "manageable", "stimulating" and "interactive", describing it overall as "a great briefing template", which was considered extremely unusual compared to their past experiences. Asked to describe how it differed from conventional project materials and was received by the team, they gave the following explanation -

"The research was all nicely ordered, so you could go into what type of stakeholder types. There was video footage, there was imagery, there were diagrams, there was data driven stuff, there were testimonials. It was all sorts. There was a real range. Different people within the creative team, and the client

servicing team can latch onto and understand different types of information as well, I guess everyone has different learning approaches."

Explaining that their design team might typically be briefed with a single image and a short description before commencing a new project, their design journey was markedly more pensive. The nature of the non-typical richness of human information made available to them encouraged them to take a more reflective approach, they stated -

"More often than not you can get into a concept phase relatively quickly when you're given a product design brief, but this one we took a lot of time to filter and do our own assessment, so what are the pros and cons of what is out there already, based on what this (the research material) taught us."

Interestingly, when asked to single out a particularly useful piece of information from the research, the selected piece was a provocative text description of the sensorial process of having a beer poured into a glass and presented, followed by a description of the experience of drinking from the glass. This description (see next paragraph) was created based upon statements users made about their preferences for beer being served in a glass vessel. This demonstrates the unpredictable potential of a variety of information formats. Although the ineffectiveness of text-based reports was a criticism raised by the designers (see Chapter 4), the designers in this study nonetheless selected an edited text based description over images and video footage showing identical sequences.

> "Beer should look good. Ales and lagers should be clear and bright, with the right head, stouts dark with a thick creamy head, even cloudy beers such as wheat beers should never look dull. As you admire your drink, you may make judgements, you'll likely see a brand stamped on the side, with all its associations, you'll notice how clean the glass looks, how new, perhaps if it is a lager you'll notice how lively it is, and maybe how this is being enhanced by nucleation at the base. As you reach out to hold it a variety of sensations will be provoked by temperature, shape and curvature. Then as you lift a vessel to your mouth you feel the weight, as it touches your lip you feel the comfort and temperature of the vessel, and as you take your first drink and the liquid enters your mouth and splashes over your

tongue before travelling down your throat you experience aroma, flavour and 'finish'."

The design outcomes produced by the design team were a collection of initial concepts based on the research material provided. These concepts were assessed by a variety of key stakeholders (many of whom were identified through the research documentation) leading to the development of two new pint glass propositions, which were prototyped and tested before being unveiled to the public. One of these concepts went into production for trials in UK bars (Design Council, 2010b).

5.1.8 Discussion of SWIG case study

This case study is an example of an emerging trend to use design in the creation of solutions to 'big picture' issues (e.g. the various topics being approached by the Design Council in their Challenges programmes, such as crime, community and healthcare) of concern to the likes of government bodies such as the Home Office and similar. Taking a holistic approach to understanding the issue, and engaging with a wide variety of stakeholders was deemed necessary by the Home Office as they did not want their approach to be perceived as heavy-handed, especially as at the time of the project the drinks industry in the UK was experiencing difficult times with fifty two bars closing every week in the UK (BBC News, 2009). Clearly the ability for designers to empathise with those they are designing for is a major asset when tackling such projects, and the material generated assisted in setting the scene for them to design well considered and perceptive artefacts was enhanced by the support material provided.

The complexity of the issue and source of the brief (i.e. Home Office) dictated that it had to be fully investigated before publicly released to avoid negative response from consumers and industry. However, such a well-considered analysis of the problem is not always possible, typically a team may have been given the brief to create a solution and the time spent on understanding the issue holistically would be greatly reduced.

The approach increased the credibility of the outcomes due to being based upon the needs of the stakeholders and a body of evidence that allowed reference to specific insights and information that inspired idea generation.

5.1.9 Conclusion of case study A

The SWIG case study acted as a test-bed for exploring the suitability of a variety of approaches and formats for human information organisation and representation, and provided insights into how designers responded to the human information formats presented. It clearly demonstrated that traditional user data such as anthropometrics are only one minor consideration amongst the many information sources relating to people from which designers can draw rich insight and inspiration from. Further to this as the subject was known the designers did not seek sizing data, but instead trusted existing design measurements. Mixing more generalised information with details relating to specific individuals worked well, and helped to create richer pictures, facts were delivered but by maintaining rawness and creating empathy designers felt confident in extrapolating their own interpretations.

Although the research materials presented were praised, they were not considered as a stand-alone solution to research, as a member of the design team stated –

> "Hearing that, experiencing it, asking those questions, it's just slightly different. I think it will always be the case, there's no substitute for the face-to-face interaction yourself, and going through that experience, but the way in which this was presented and being able to get the different types of research methodology by video footage and more interactive types of research made it extremely useful."

They expressed that the material was extremely useful as they encountered great difficulty in arranging their own meetings with stakeholders; however, they still deemed such interactions as important to their process. This need demonstrates the desire to build empathy, but is also a matter of due-diligence. The designer explained that their concept generation was based on a

combination of what the research materials had taught them and their own ‘gut-feel’; hence, to corroborate their decisions they naturally wanted to be sure that the research was sound.

5.2 Case study B (DBO): human information delivery during design development

Case Study A confirmed the value of human information prior to design development; however, it was highlighted during the interview held with the design company post-development that the depth and focus of the briefing material was highly valuable and usable, but equally unusual in its thoroughness. Therefore it was considered important to engage in a more typical design development project, where a traditional brief was in place and the human information being used was obtained on demand during the design process, with the typical limitations such as access and time.

5.2.1 Introduction to case study B

With a brief in place, a participant-observer perspective was once again obtained in this commercial development project through undertaking the role of a lead researcher on behalf of the Human-Centred Design Institute (HCDI) at Brunel University within a team of three distinct groups (i.e. research, design, and manufacture) that allowed a triangulation of expertise towards the common goal of designing hospital ward furnishings in such a way that they would reduce the risk of spread of health care associated infections (HCAIs). The project was commissioned by the Department of Health and the Design Council as part of the 'Designing Bugs Out' initiative, the intention being to tackle the problem of Health Care Associated Infections within UK hospitals.

The three groups that made up the team consisted of the manufacturing group 'Kirkton Healthcare' who had knowledge of manufacture for the healthcare industry and the relevant standards, in addition to testing facilities for material investigations and pressure mapping; the design group 'PearsonLloyd' who brought in aesthetic and materials knowledge, as well as experience of the furniture market; and finally the research group 'Human Centred Design Institute' who brought knowledge in people-centred approaches and were therefore responsible for providing insights about the identified stakeholders. This three-way approach intended to create concepts that included issues of

importance from the various perspectives concurrently from the offset, with a particular focus on user needs as requested within the brief. Once again the addition of a people-centred research element to the process was intended to inform the team in terms of information and empathy about the complex issues involved and broad range of relevant stakeholders (e.g. patients, nurses, cleaners, etc.) in a designer friendly way.

An interesting element of this study that will be further elaborated in this chapter was the fact that the designers had not previously undertaken projects in healthcare environments; therefore, the hospital setting was a challenge that they had no previous experience of and hence had to rapidly acquire access to information detailing the complex and multi-dimensional arena. This was made more challenging as healthcare environments are difficult to access due to their sensitive nature, and access limited as taking large groups onto hospital wards not being permitted by participating hospitals. To overcome these issues the researchers, who had been granted access to St Mary's Hospital Paddington through the commissioning body (i.e. Department of Health), looked to capture a variety of rich and textured data, and to compile it in ways that could communicate the problem and stakeholder needs to designers, removing the need for them to personally observe it as far as possible.

5.2.2 Background of case study B

HCAIs can affect both patients and healthcare workers. They are difficult to treat, and can complicate illnesses, cause distress, and even lead to death. HCAIs are also a huge financial burden on the UK's National Health Service (NHS). Aiming to identify and fast-track the implementation of new technologies and design-led innovations to combat HCAIs, the UK's Department of Health (DH), in partnership with the Purchasing and Supply Agency of the NHS and the Design Council, launched the Challenge 'Design Bugs Out'.

The design challenge invited teams to redesign hospital furniture and equipment to make them easier to keep clean, and so help reduce patients' exposure to HCAIs and improve their hospital experience. The infection rate in

UK hospitals is high; estimates suggest there are at least 100,000 cases of hospital acquired infection in England each year causing around 5,000 deaths, and costing the National Health Service (NHS) as much as £1 billion a year (National Audit Office, 2004).

HCAIs can affect both patients and healthcare workers. HCAIs are often referred to as 'superbugs', and typically include infections such as Meticillin-resistant Staphylococcus aureus (MRSA) and Colostridium difficile (C. difficile). Superbug contamination can be spread through contact between healthcare workers, hospital visitors or medical devices and equipment. A body of existing data (Health Protection Agency, 2008) clearly demonstrates that infection is most evident in the sixty plus age range (i.e. older patients are prone to HCAIs.)

The Department of Health considered a people-centred approach as critical to successfully combat HCAIs within healthcare settings, as demonstrated by the following quote -

"If the burden of healthcare-associated infection is to be reduced, it is imperative that architects, designers and builders be partners with healthcare staff and infection control teams when planning new facilities or renovating older buildings" (Wiseman, 2001).

The challenge to the UK's design and manufacturing community was to design and prototype new furniture, equipment or services for hospital wards that help to reduce HCAIs, through five design briefs released by the Design Council. The two undertaken for this research were 'Bedside Environment', specifically a patient chair intended to fit with existing ward environments and be easy to clean and maintain, cost-effective, and sustainable. The second brief upon which greater research focus was given (the reason for which will be explained later in this chapter) the commode (a portable ward-based toileting unit) to be designed in such a way that it be easy to clean, enhance usability, patient experience, comfort and dignity.

5.2.3 Purpose of study

This case study allowed the researcher to gauge how rapidly one can make impact on design thinking and convey human information to a team of designers where commercial constraints exist and tight deadlines are in place. Of particular interest to the research was the fact that the designers, although familiar with conventional seating (hence previous experience and tacit knowledge was useful for the bedside chair), found the commode an entirely new proposition, meaning that their tacit knowledge and previous experience of the object and setting was very limited. Therefore, new human information was critical to successful understanding of the issues, and would have a very significant impact upon the design outcomes. This provided a perfect opportunity to explore information and empathy and the practical implications of the themes of retrieval, representation, organization and reflection, as well as allowing an insight into the conventional criteria of information demands designers have in order that it is usable within their processes.

Given the responsibility of meeting the designers' user based information requests, the project proved ideal for identifying when human information needs were highest and lowest.

5.2.4 Research approach

It is worth noting that the designers who had extensive experience in seating design were keen to apply their existing knowledge on the patient chair hence the human information requests for this were minimal; however, they were less confident in regards to the commode, as it was a markedly different proposition functionally and aesthetically to their previous work. Hence the commode received most research attention.

The research approach required that the researcher respond to the information needs of the design and manufacture teams rapidly, hence the time limitations similar to a typical project were in place and the designers responses to a variety of information delivery means could be assessed within realistic

constraints. A meeting was held at the end of each week where results from each branch of the team were delivered, and new requests and deliverables set for the following week.

Opportunities for experimental methods, which are designers' preferred means of engaging with users for prototype testing and similar (Nickpour and Dong, 2009), were extremely limited due to the sensitive nature of the subject, and the ethical implications. The researcher's goal was therefore to capture information on behalf of the designers and where gaps existed simulate environments to create representative and holistic people-centred overviews. Towards acquiring this information the following studies were conducted to capture user requirements and identify relevant issues (Table 5.5) –

Table 5.5 - Studies conducted to capture requirements

Studies	Purpose	Information
Visit to local hospitals	Initial insights	Video footage; Pictures; Quotes
Stakeholder interviews (i.e. patients, carers, cleaners and nurses)	Further insights. Product journeys	Personas; Interview footage; Journey mappings
Expert Consultation	Consensus on issues	Expert feedback; Quotes
Nurse questionnaire	Exploring emerging issues further	Quotes; Charted responses
Workshop (with designers, manufacturers, patients and nurses)	Physical 1-1 confirmation of insights	Role-play feedback; Pictures; Physical interaction with stakeholders and datum designs

Visit to local hospitals

The initial exploratory visit made to St Mary's Hospital in Paddington to explore the environment and get an overview and sense of the typical usage of both commodes and bedside chairs in situ proved extremely fruitful, with a range of mixed media material being collected (i.e. image, video, audio, anecdotal). During this visit the researcher visited three hospital wards with considerably different patient groups selected for investigation based upon their potential to highlight differing needs: the quiet and orderly 'stroke' ward, where patients require a more individual attention with movement and posture due to the nature of their condition; the clutter and bustle of the 'high dependency' ward; and finally the 'geriatric' ward, which through paper based research had been identified as high risk. Full access was arranged through St Mary's Showcase Manager to each ward in its entirety, which was particularly useful for investigating areas of relevance such as the 'sluice' room (Figure 5.4), where storage, disposal and cleaning of equipment is carried out.

Figure 5.4 - Sluice room

During these visits nurses were shadowed; semi-structured conversational interviews were carried out and audio recorded on ward with a variety of stakeholders (i.e. two head of ward nurses, two staff nurses, one physiotherapist, two cleaners); pictures were taken of the environment and the specific on-ward artefacts discussed; video footage was also taken to capture the cleaning process typically carried out on commodes (Figure 5.5), in addition to how nurses interacted with it in general (e.g. dismantling, manoeuvring etc.)

Figure 5.5 - Video footage of the cleaning process

The video of the cleaning process in particular provided a useful overview of the operation and parts of the commode, and became one of the most referenced research materials of the project. Through shadowing nurses the researchers identified issues that would have otherwise been difficult to identify upon examining the product, such as specific details of use illustrated by the following comment made by a Head Nurse at St Mary's Hospital -

"It doesn't take long (to clean). Obviously if someone has had an accident it takes longer. Then sometimes it gets in here (small recesses in wheels), which I have had and that takes some time to clean."

The people-focused flavour of the information provided by nurses produced some of the more inspiring and insightful pieces of human information. Revealing various stakeholder viewpoints and helping the designers to empathise with the situation; a great source of in-depth insight into the nurses

and patient experiences, beyond simply the physical constraints of the designs, in relation to commode use –

“They might ask to go to the toilet (WC) if they are really uncomfortable doing something in the ward, not because of this (the commode) but because they’re ashamed, maybe because of the smell.” Staff nurse 1

“Maybe just the thought of someone at the next curtain. There could be visitors, it could be visitor time” Head nurse 1

One major limitation of the hospital visits was that it was only possible to approach hospital staff members on ward. Although those approached had been identified by the team as key stakeholders (i.e. physiotherapists, nurse, cleaners etc.) the on-ward patients were omitted. However, the viewpoints captured on-ward were later compared and challenged with patient perspectives in a simulated setting. The later consultation was required due to ethical procedures, which had rendered on ward interactions with patients impossible.

Benchmarking

Benchmarking had been carried out on existing products by the design team, to detail costs and feature variations. Upon verifying the commode model found at St Mary’s was also the most popular commode model in use in UK hospitals, this model was treated as the datum product for future comparisons and analysis. The commode detailed was produced by Vernacare and known as ‘Vernachair’. One of these units was purchased to allow thorough interrogation of a commode and analysis of the functionality and parts (Figure 5.6).

Figure 5.6 - Identified commode parts

Stakeholder interview

In addition to hospital visits, ten additional people were interviewed in total, including five patients from different age groups and with various experiences in hospital wards, three nurses, one cleaner and two carers. The interviews were based around 50 questions (i.e. 10 general, 20 bedside chair, 20 commode), which were predominantly suggested by the designers. The interviews were video recorded with the consent of the interviewees.

Initially upon conducting the interviews key quotes were noted on several pages of text and a hard-drive containing the original footage was made available to the designers. This received negative feedback, the designers were interested in specific elements relating to questions they had; however, additional quotes that were felt to be potentially useful were largely overlooked. Having left the footage with the designers the researcher noticed that some of the details reported were not coming up in team discussions and questioned whether the interviews had been watched in the two weeks preceding delivery, which they had not.

This led to the use of personas compiled using key direct quotes from the participants (e.g. Figure 5.7) in order to put across issues that were considered

design relevant and to encourage the designers to delve into the video footage if they were intrigued by the responses. In contrast to conventional personas that tend to generalise and be created to communicate needs of groups, which designers engaging with the interviews within Study 1 had indicated were considered to be 'contrived' and 'constructed', each of these personas and was not generalised but based around accounts of an individual experiences. This was evidently a more engaging form of communication with some of the highlighted quotes being repeated by the designers on several occasions, and some of these quotes having clear impact upon the design thinking (e.g. the depth of the disposable container being increased). Internally the designers had access to images and footage of the original footage; however, for external presentations and more general use the identities of the interviewees were made anonymous. The raw footage was minimally accessed as it was considered "too time consuming" in its unedited state.

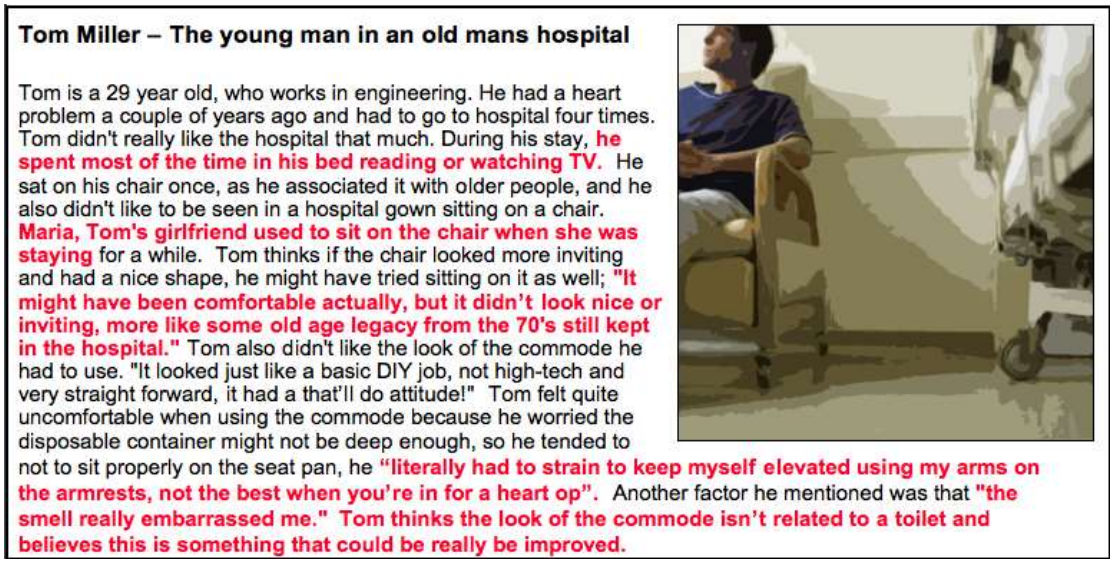


Figure 5.7 - Persona example

This was a strong example of designer's desire for inspiration informed through a raw and real format in order that empathy can be established, however time consideration demanded it be edited in such a way that it can be absorbed quickly through highlighting main insights.

Use analysis

The processes for use of the commode and bedside chair were summarised by nurses consulted on site; these were validated as part of a questionnaire distributed to six nurses. From this the two most frequent modes of use were identified as 'bedside use' and 'ward toilet use'. The researcher delivered a step-by-step textual description of two distinct commode journeys observed on ward, accompanied by general pictures of the ward space. Having initially provided the descriptions as text only the design team expressed they would be more useful to have the images presented in a storyboard. They collaborated with the researcher to illustrate the commode journeys as visual storyboard overviews (Figure 5.8) for clarity and ease of analysis. This visual re-interpretation of the details uncovered by the researcher was a clear indication of the designer's preference for visual materials to inform their process. This became a consideration for the presentation of research findings throughout the remainder of the study.

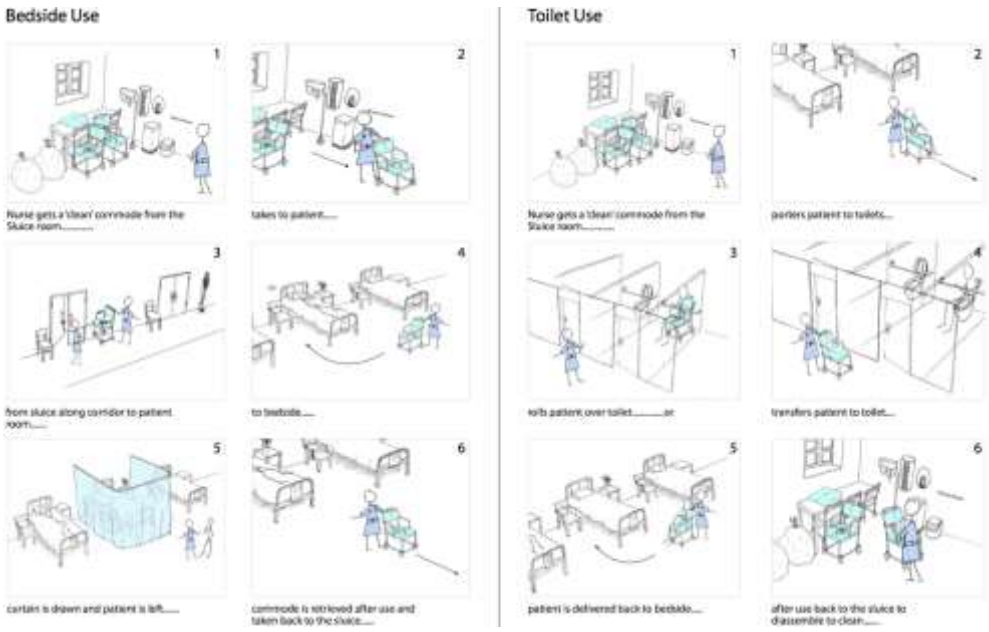


Figure 5.8 - Visual storyboards of commode journeys (drawn by the design team)

Expert Consultation

Alongside the first hospital visit, an expert reference panel session was used to interrogate emerging issues from an expert standpoint. The panel was selected by the Design Council and the Department of Health, and consisted of 10 experts in related fields, such as nursing officers, infection specialists, and policy implementers.

Informed by initial research the team compiled a set of topics, which the panel were engaged in a one and a half hour discussion around. This session was predominantly used to confirm assumptions and remove ambiguity with questions that involved multiple stakeholders, such as whether a cover used for over the commode would be acceptable, if removed daily to be washed alongside bed sheets etc.

Nurse questionnaire

Based around issues identified by the team (predominantly driven by the designers) a final questionnaire was developed and distributed to six staff nurses from three different hospitals. This was carried out to obtain more in-depth opinions, insights and consensus into the use of commodes and to compare the consistency of approaches and procedures across different wards/hospitals. The questionnaire used a combination of open ended, closed ended and likert-scale questions such as –

How many commodes are on a typical ward?
Do you clean the commode after EVERY use?
How important is space in the sluice room for storing the commode? (Rating 1-5, 1 being unimportant, 5 being very important)

These questions helped inform issues that the team wanted to gain final consensus on. They were less about insight and inspiration, but instead fact based investigations, requesting definitive information. The following

paragraphs and charts demonstrate the kind of information that was determined.

There was a significant difference in response as to the time taken to clean a commode (Figure 5.9). It was concluded from this that some nurses carried out a thorough clean, through approaches such as dismantling components and cleaning each surface; however, it was also apparent that some nurses carried out a more superficial cleaning process. One nurse confirmed this through her comment -

“For a full MRSA clean it would take 20 minutes.”

Suggesting that a cleaning time of three minutes or less is highly unlikely to protect against HCAI’s. When questioned as to how often they dismantle the commode for cleaning it became apparent only one did this, the others giving responses such as -

“once, at the beginning of my shift”

“never, I just clean the seat area, and wash the footrest”

This helped verify the suspicions of the team that the process for thoroughly cleaning the commode is currently time consuming, awkward and not intuitive, which became focus areas identified for design improvement.

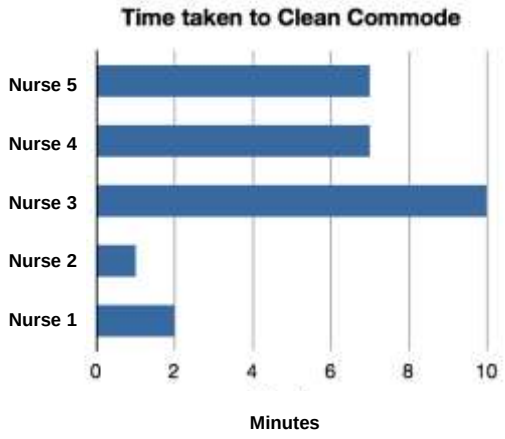


Figure 5.9 - Time taken to clean commodes

Simulation Session with Nurses

Although the research materials (e.g. videos, images and storyboards) presented to the designers directly led to early versions of all concept features that were apparent in the final designs, the designers still consistently requested that attempts be made to secure ward visits to allow them to personally experience the environment and meet the various stakeholders. However, as mentioned earlier group access to these sensitive environments with the intent to thoroughly scrutinize them was unobtainable. Therefore, the alternative provided was a simulation of the environment to capture the main characteristics closely as possible through a constructed ward setting. Several of the identified key stakeholders were chosen to attend: two nurses, two recent patients and an occupational therapist. Representatives from the design group, manufacturing group, and the research group attended the workshop, so the discussions involved each perspective. Group discussions were held followed by interaction with the bedside furniture through role-play (Figure 5.10) where the full routine of commode use was demonstrated by a nurse using team members as 'patients'.

The simulation was held in the training facilities for occupational therapists in the Mary Seacole Building at Brunel University. This facility holds a fully functional hospital suite, with all the items commonly found on a ward such as hospital beds, bedside chairs, tables, pulleys and assistive devices. The identified datum product was brought in, as were several competitor commodes.

The investigations helped to form a comprehensive view of the use of commodes and bedside chairs. With all equipment at hand and nurses on site the process could be interrogated fully and any remaining unanswered questions addressed. The use of role-play gave team members insights they hadn't expected –

"It's really strange, when you sit in the commode you realise how difficult it must be to go. The shape of the pan actually squeezes the buttocks together, it's nothing like sitting on a conventional toilet." Manufacturing team member 1

Figure 5.10 - Role-play with commode in mock-up hospital environment

5.2.5 Value of research

The research helped to create a clear scenario in regard to the use of commodes and bedside chairs, and identified the primary and secondary needs of the various stakeholders (Figure 5.11).

Primary	**Secondary**
Easy to clean	Removable lid
Minimise parts	Minimise junctions
Mobile	No cavities
Easy maintenance	Braking
Ergonomic	Fit over normal toilet
	Rotating arms
	Footrest

Figure 5.11 - Primary and secondary needs (drawn by the design team)

These needs were further narrowed down to principal function and key needs for those identified as the primary users (i.e. nurses and patients). These were considered crucial characteristics of any resulting designs (Figure 5.12).

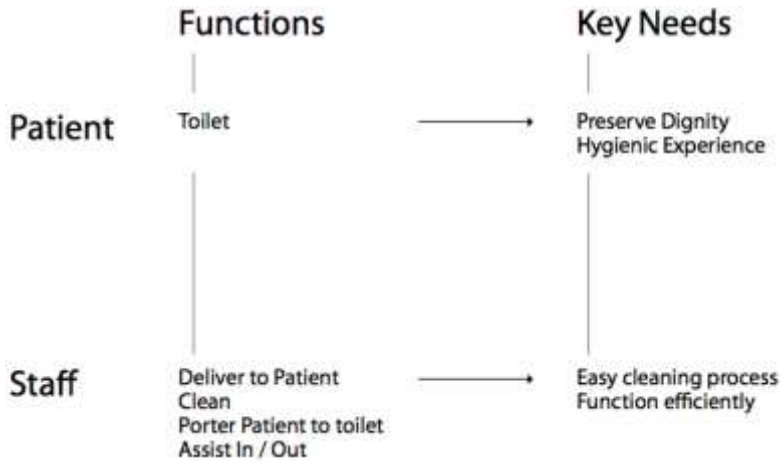


Figure 5.12 - Functions and needs of stakeholders (drawn by the design team)

5.2.6 Findings and results

In line with the issues identified in the literature analysis it was apparent early in this project that conventional means of communicating research findings were not received well by the designers. Hence the presentation of research materials were developed into various media formats and where possible more visual in order for it to be taken into consideration within the fast-paced design environment.

Through a process of trial and error the human information demands of the designers resulted in three main criteria emerging that typified the designers requested for research deliverables. These are listed below, with project-based examples –

Information – knowing the detail (e.g. understanding the required journeys made by the commode lead to mobility remaining a primary need, although the designers initially proposed removing the feature from the existing design)

Insight – being made aware of the non-obvious factors (e.g. the sluice room was a mystery to them, realising the chaotic nature of the room and storage concerns lead to the 'stacking' concept)

Inspiration – textured details (e.g. nurse clip talks about difficulty of cleaning in between wheels when patients have 'explosive' episode lead to the introduction of sealed wheels)

5.2.7 Discussion and conclusion of Case Study B

This case study proved ideal for exploring human information capture, communication and use due to the sensitive nature of the end users and the environment/use of the products. Being well-versed in furniture design, one product was within the realm of the design teams previous experience, the patient chair; however, as the other being a commode was a more healthcare specific item and was unlike any previous products they had encountered, hence they had no prior data they could refer to. The designers found themselves in a situation where their own prior knowledge was limited, availability of existing knowledge restricted and opportunities to compile new data both time-consuming and difficult to arrange due to the sensitive nature of the hospital environment and ethical issues.

As the existing information available to the designers from the offset of the project was not aimed at them (i.e. it was predominantly aimed at medical professionals) and was difficult to translate, knowledge was limited which drove the need for collecting and managing primary data. With access to information a major obstacle when it was most needed. This imposed the need to have information delivered to them, which allowed the researcher to present human information in a variety of ways and gauge the reaction and impact.

The researcher responded to the information requests of the design team, and developed strategies for information retrieval and representation, in attempt to replicate the more hands on and human focused research desired. A major insight from this work was the levels of data request through the course of the project. This was compiled based on the days of work required from the researcher against the designers project plan (Figure 5.13).

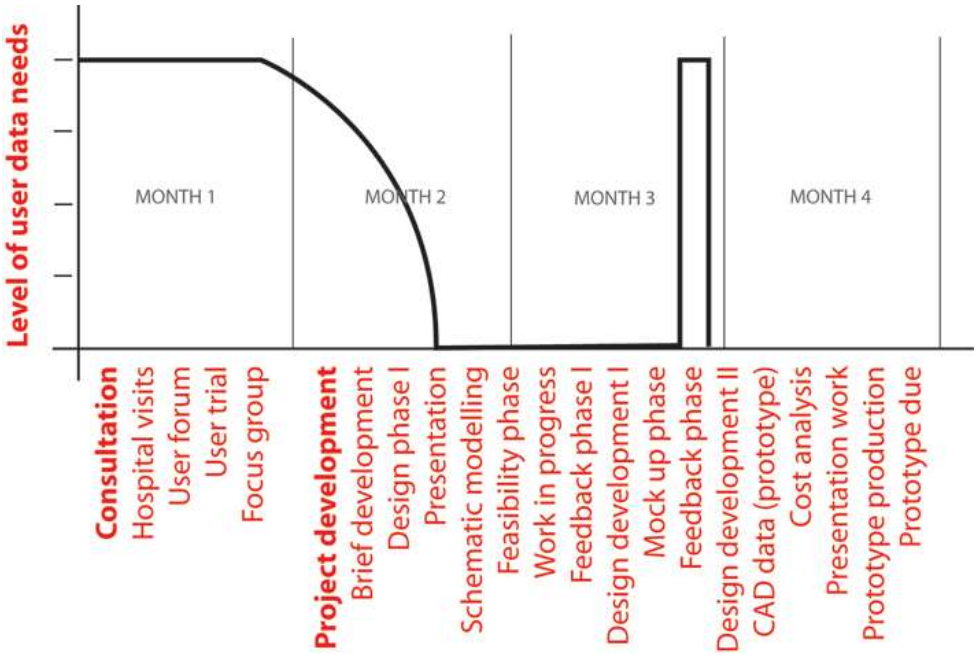


Figure 5.13 - Human information requests compiled against Gantt chart

Figure 5.14 derived from the project Gantt chart developed by the design team illustrates the user data needs began high and continued at this level through the 'discover' phase, steadily it reduced through the 'define' phase as with better understanding a refinement of queries occurred, which led to a reduction in the volume of data needed. During the 'develop' and 'deliver' phases the concepts were developed to a point where prototypes required testing, hence user data again peaked for interrogation and evaluation of proposed solutions with user requirements, before the 'deliver' phase, at which point all user data was in place. In step with this the research demands were extensive at the 'discover' phase, and the early stages of 'define' phase; however, the human

information demands for the 'develop' phase was minimal as the user interaction was solely used to test prototype alternatives.

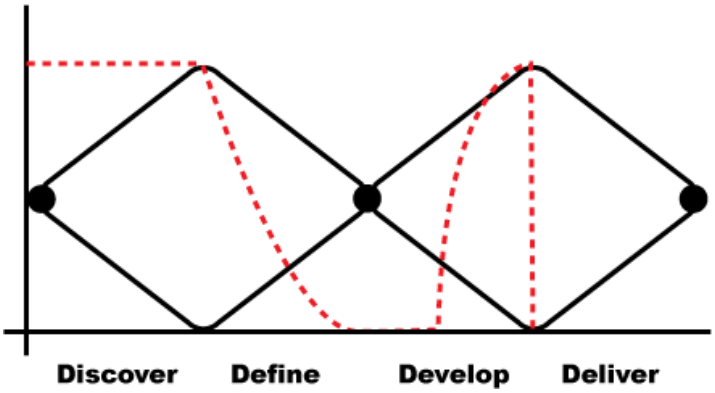


Figure 5.14 - Double Diamond model with hypothetical user data needs plot

The researcher quickly identified that the designers were most interested in ward scenarios but such information was exceptionally difficult to access. So a combination of methods were adopted to help form the knowledge base, such as shadowing nurses in hospital wards, developing personas based on stakeholder interviews, compiling multimedia data (e.g. pictures and video footage) and engaging the design and manufacturing team in workshops in a simulation room, which allowed the designers to engage with hospital equipment, stakeholders and to participate in role-play of use scenarios. Most of these methods proved effective in engaging the design team and helped them to develop understanding of the issues. However, personas were problematic to the designers, and required some tweaking. The designers explained this could be due to the fact that method was not familiar to the design team and they did not initially appreciate the value of it. The researcher also considered the anonymous images to be a barrier, based on designer responses.

Ideally the role-play workshop could have been organized earlier to give the design team insights into the users' concerns and real use scenarios earlier in the design process. However, establishing contacts with nurses and patients took time. Hence another insight from this project was that designers want raw,

useful and focused information delivered quickly in engaging ways. This is in conflict with the fact that user research takes time – therefore balance has to be established based on mutual understanding of one another's needs and limitations.

5.3 Summary

The varied nature of design projects makes the use of human information difficult to predict, as each project unmistakably requires particular data. For those projects engaged with in these case studies the data needs were indeed varied but could broadly be considered mixed media people related resources that provide information, insight and inspiration in design relevant ways.

Case study 2B (i.e. “DBO”) highlighted that in sensitive environments such as hospitals little can be assumed due to their dynamic, variable and complex nature. However, if previous related experience is in place designers are happy to proceed with what they know (i.e. in the case of the patient chair); however, they are less confident if the artefact being designed is out with their previous experiences (i.e. the commode); and are very receptive to any material that can clarify the environment for them. Only through engaging with good human information material did both the variety of stakeholders and a holistic overview become understood, the human information having a clear and tangible connection to concept outputs.

In both studies the researcher collecting mixed primary data was the most successful approach. Although difficulty can exist in arranging and authorizing primary research in such environments, through establishing a base of information and connections, routes and information sources, future data gathering and knowledge communication within a similar setting could be more streamlined. The use of secondary data did play a larger role in Case Study A (i.e. “SWIG”) through collection of material such as newspaper articles and police reports; this was largely dictated by what was accessible and connections the team had to experts in the subject area. This material is object specific (i.e. the pint glass); however it does build a broad knowledge resource and further understanding of the environment, which would be applicable in a broader context for future related work (i.e. drinks trade).

Insights gained by engaging all relevant stakeholders during the identification of problems and procedures, led to the definition of a relevant design specification, and hence effective design concepts were developed.

In case study B (i.e. “DBO”) the designer’s requests indicated the main period for broader human information input was at the front end of the design process where knowledge is lowest and designers have greatest creative freedom. This is where the most rapid absorption takes place, and time efficiency is desired.

An issue remains in that early exploratory research is rich in content and insight, therefore editing this information for fast communication risks potentially losing important detail, or influencing how designs might develop based on researcher deductions. This may in turn cause opposition from designers, who would ideally be engaged in raw data reviewing and editing. The key challenge therefore remains in how designers and design researchers might quickly gather not only accurate and relevant information for use in design, but how this information can be communicated in both engaging and inspiring ways, talking the designer’s data language. The indication is that the criteria for imparting human information to designers successfully require that they gain a combination of insight, inspiration and/or information through effective communication means. In order to achieve this, a combination of the elements has to be addressed –

Who and what require representation?

Where can the necessary human information be retrieved?

How can this human information be organised?

How can reflection upon the information be facilitated?

The following diagram (Figure 5.15) gives examples of how these were addressed in the case studies.

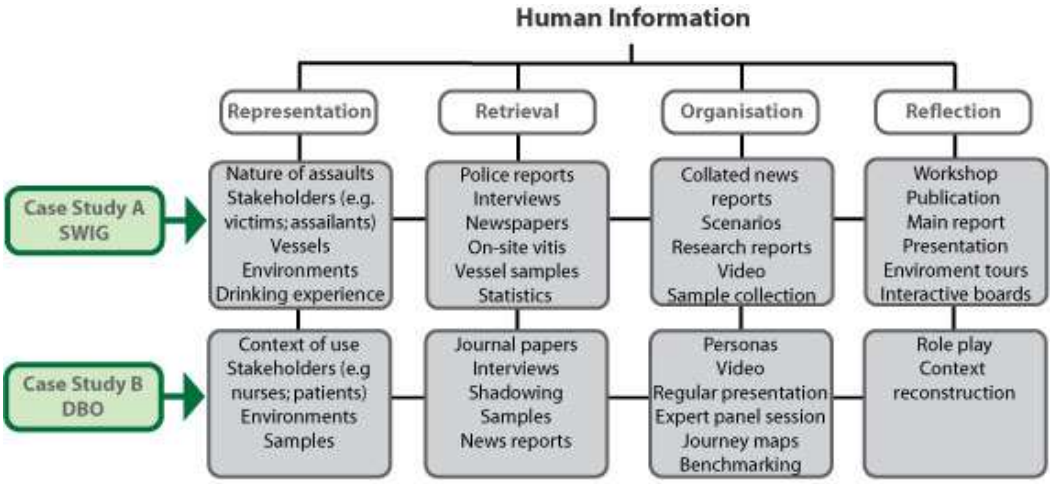


Figure 5.15 - Case study representation, retrieval, organisation and reflection

Chapter 6. Resource development: tool concepts

As discussed in Chapter 2, design can be a messy process when dealing with real-life problems and inter-related issues within these. The inherent nature of such problems demands that under-defined elements are managed by designers through a process of 'reflection-in-action' (Schön, 1983). This involves spontaneously using tacit knowledge and previous experience in addition to available materials relevant to the situation, to reshape the problem as they proceed; hence, there is potential to inspire, inform and bring new insights to this reflective process through the delivery of effective human information resources during this process (as demonstrated in the real life case studies in Chapter 5).

This chapter describes a process undertaken to communicate, evaluate and expand upon tool concepts, which were created to explore means of delivery of information and empathy stimulus to inspire, inform and bring new insights (i.e., the topics explored in Chapter 2). Workshops were carried out to identify desirable content and criteria through proposing a broad range of human information options embodied in a variety of ways within tool concepts. The propositions touched upon the themes of representation, retrieval, organisation and reflection that were identified through the interview findings of Chapter 4. The process of generating tool concepts and using them in a rating and co-design workshop with designers is explained in this chapter. In particular, the process sought to identify how effectively the designers believed the propositions might align with their current practices and needs, with a view to their potential inclusion in their design processes.

The chapter is structured as follows: section 6.1 will explain the process of development used to generate the broad tool concepts; section 6.2 will go on to explain how these tool concepts were evaluated and developed through two workshops; section 6.3 will report the findings from these workshops; and section 6.4 will discuss and summarise the study.

6.1 Development of tool concepts

Through generating and detailing a selection of concepts based upon available data and previous studies, designers' responses to them could be gauged, and the researcher could start to understand how effectively designers believed they could work with each resource configuration. The designers had to consider how such propositions might assist their interrogations during the design process, towards forming new connections and insights. Effectively this study gauged the potential of a broad range of resource characteristics, presented as 'under construction' tool concepts, encouraging designers to critique frankly (Allan *et al.*, 1999) the potential they perceived in such resources.

The intent across the collection of concepts was to propose options that would make human information engaging rather than 'lifeless', which was identified as a fault in currently available tools in Chapter 2. Several other key factors were identified in the literature review as key to the uptake of any proposed human information tool concepts. Factors included elements such as intuitiveness, transparency, availability, and ease of use (Fidel and Green, 2004).

Examining opinions towards incorporation of existing information resources such as anthropometric data was also considered important in this study, as they are readily available information resources that remain largely unused by designers (Nickpour and Dong, 2008). This study portrayed potentially desirable characteristics for the presentation of data and preferences for data tools, from the perspective of designers. These preferences included more visually engaging and appealing means of data presentation; hence, the concepts were developed using highly visual formats and suggested means of data manipulation, suggesting simple and intuitive interfaces. The concepts were expanded beyond solely anthropometric representations, and included more general ergonomic detail and ethnographic elements such as images and footage of everyday activity and use of artefacts. To address inclusive thinking, diverse user groups were also included. The concepts were deliberately left under-defined,

suggesting an overall principle, number of possible features and content. This allowed the participants to place their own interpretations onto the concepts, which would enhance their feedback, allowing them to elaborate during the assessment and add unplanned features during the co-design task (McGinley & Dong, 2009).

Four overarching questions were being explored in relation to human information resources; two were suggested by the concepts, and two the designers were left to decide:

Suggested by the resource -

Who, do designers want to know about?

What, do designers desire to obtain?

Derived by designers -

When, would this information have most value?

How, would you interact with this information?

The tool concepts

An earlier study (Nickpour and Dong, 2008) which formed part of the larger EPSRC project (EP/F032145/1) from which this thesis began, investigated the current usage of anthropometric data by professional designers. Based predominantly on this study and the literature analysis, a collection of eight tool concepts were created, developed and illustrated by the researcher (except for the ErgoCES tool, which was included as part of the larger project). The creation of these concepts was a design development process, which drew on the researchers design and visualisation experience and skills. The tool features were based on preferences, criticisms and suggestions on existing tools and resources as communicated by designers through the literature and supported by the studies within this thesis. The various tool features were separated into distinct groups; then feature lists were compiled before being sketched up as initial concepts, each embodying ideas such as the use of mixed media, or the

use of up-to-date real people in context and in natural postures. The concepts were finally distinctly communicated in tool concept visualisations, created using Adobe Photoshop and Illustrator. The concepts were deliberately left under-defined, suggesting an overall principle, possible features and content, but not giving explicit detail in regard to the data content (i.e., who and what), the intended use (i.e., when), or the means of manipulation or presentation (i.e., how). This allowed the participants to use their own interpretations of the concepts, which would influence their feedback, allowing them to elaborate on their interpretation during the assessment, and potentially increase new features created during the co-design task. This provoked development, definition and change by the designers, whilst they considered how the tools might or might not work for them. The eight tool concepts are now presented.

2DPeople (Figure 6.1) – this concept proposed a searchable database focusing upon anthropometric data. The data could be searched via drop down menus of variables such as sex, age and ethnicity, upon selecting the criteria a 2D example with accompanying data would be generated, which could be further refined by scanning the full range of percentile values for an average person with the selected criteria. Once the required constraints were input, the model generated could be used to inform design decisions and, if required, exported for inclusion in the designer's own visualisations (e.g., layouts; concept sketches; etc.)

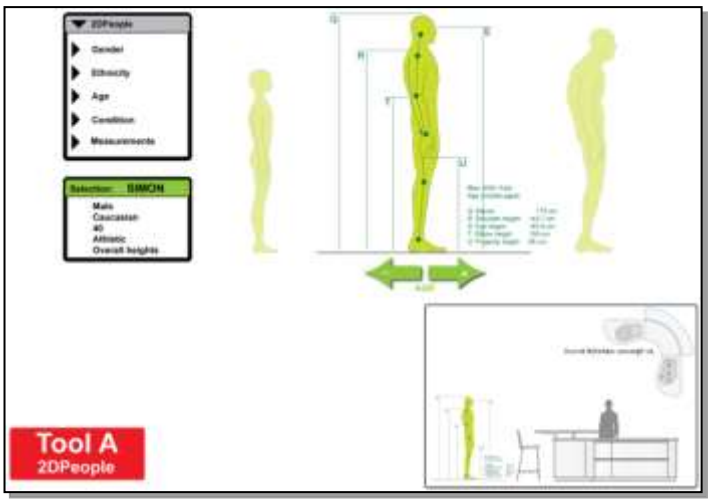


Figure 6.1 – 2DPeople concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.1.

Table 6.1 – 2DPeople characteristics

Who	Percentiles derived from existing data
What	Anthropometrics and visualisations
Themes	Representation; Retrieval

Posture Sourcebook (Figure 6.2) – this concept proposed a fixed pictorial database of common activities. The resource included a variety of people captured undertaking everyday tasks, demonstrating the full range of body movements required to undertake these tasks, with close detail of hand postures and similar. The content would be taken from real life scenarios instead of the clinical representations often found in books, in order to present more naturalistic series of postures (e.g., slouching etc.) than represented in conventional anthropometric data sets. The tool proposed a sample range of users (i.e. age; sex; percentile) covering 5th, 50th and 95th percentiles undertaking activities that would give visual examples of postures of use.

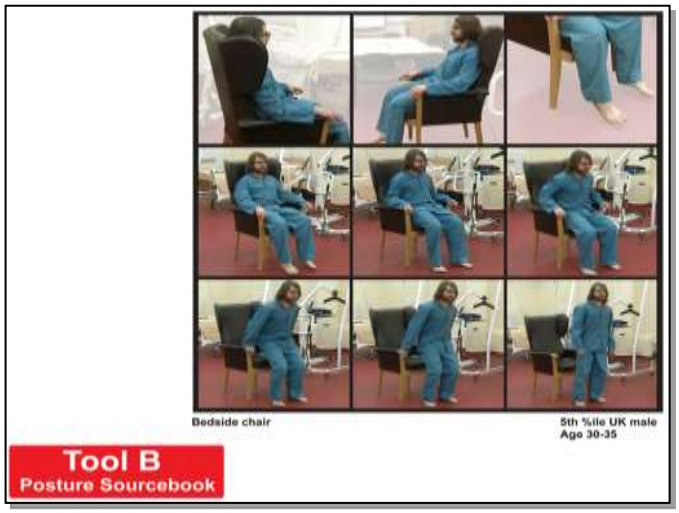


Figure 6.2 – Posture Sourcebook concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.2.

Table 6.2 – Posture Sourcebook characteristics

Who	Representative range of people
What	Postures and photographs
Themes	Representation; Reflection

ErgoLab (Figure 6.3) – this concept was more conventional in that it proposed a physical laboratory staffed by industry experts and extreme users. The proposal brings together cutting edge expertise, resources and tools for user research and testing, in a collaborative space for user-centred design. This concept would allow the designers to interact with individuals and objects in a way that would not be possible in a piece of software or similar.

Figure 6.3 – ErgoLab concept

Who was presented, in what format and the themes the concept was exploring are highlighted in Table 6.3.

Table 6.3 – ErgoLab characteristics

Who	Experts and extreme users
What	Test results
Themes	Retrieval; Reflection

People Universe (Figure 6.4) – this concept featured a user database containing individual video profiles, images and measurements. It used a highly visual browsing approach as well as conventional keyword search. It was proposed that it would contain several initial profiles, but would be fully updatable, to allow designers to input new user profiles and data as they collected it.

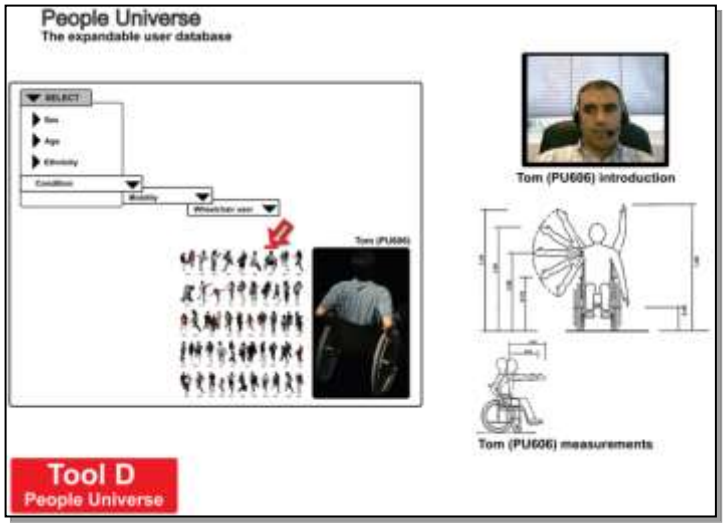


Figure 6.4 – People Universe concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.4.

Table 6.4 – People Universe characteristics

Who	Collection of individuals (updatable)
What	Measurements, pictures and video
Themes	Representation; Retrieval; Organisation; Reflection

ErgoCES (Figure 6.5) – this concept proposed to incorporate large quantities of existing datasets based on people and products. These datasets could be browsed through, or parameters compared in a graphical manner, with axis categories being defined by the designer. The proposal was that 2D data visualisation could be produced quickly for inspection and comparison. (note: this concept was not developed by the researcher, but the researcher had input into the development through project discussion).

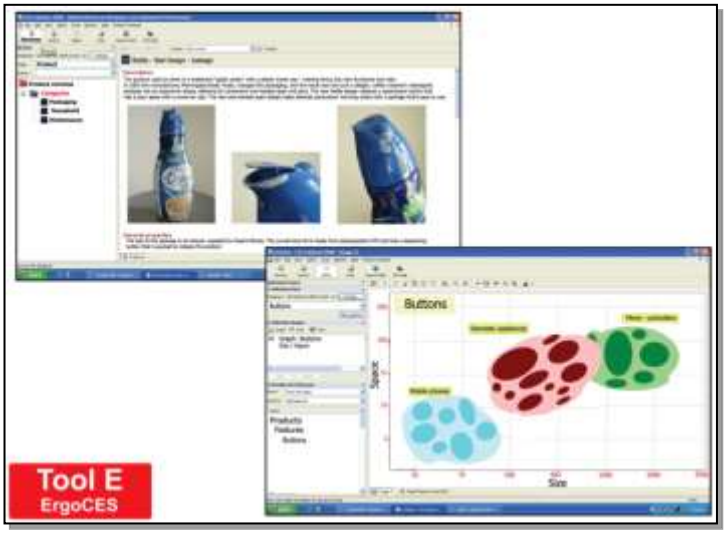


Figure 6.5 – ErgoCES concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.5.

Table 6.5 – ErgoCES characteristics

Who	Averages drawn from existing data.
What	Anthropometrics and visualisations
Themes	Representation; Retrieval; Organisation; Reflection

3DPeople (Figure 6.6) – this concept proposed a 3D human model generator. Variables such as sex, age and ethnicity could be input to generate 3D scale subjects for use within 3D CAD packages, and for visualisation and presentation purposes. It also offered a sensory representation feature (i.e., visual conditions), which places representative filters over 3D CAD models to illustrate potential issues of concern.

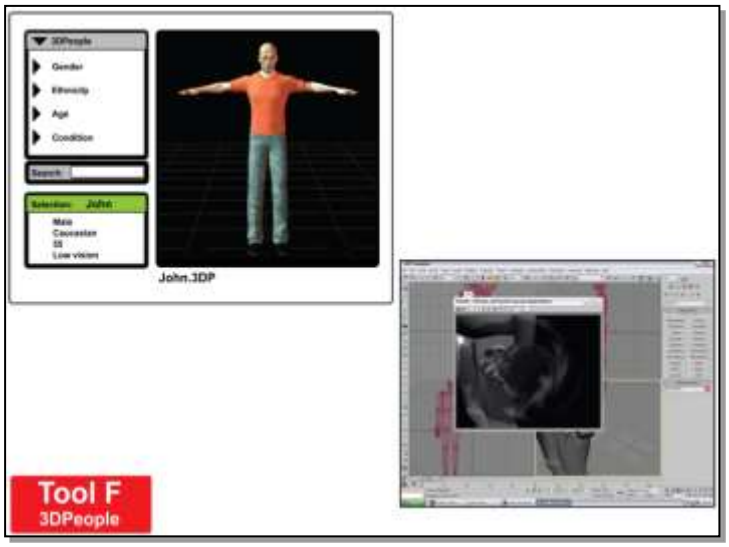


Figure 6.6 – 3DPeople concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.6.

Table 6.6 – 3DPeople characteristics

Who	Standard representations in 3D
What	Anthropometrics and 3D models
Themes	Representation; Reflection

PeopleSpace (Figure 6.7) – this concept proposed a networking tool, in the form of an online community and special interest group, with a key goal of bringing together real people and real designers. It would allow discussion, assistance, and news in a general and product specific way. It allows the exploration of design issues without the need to leave the home or studio.

Figure 6.7 – PeopleSpace concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.7.

Table 6.7 – PeopleSpace characteristics

Who	Individuals
What	Opinions, reviews, experiences.
Themes	Representation; Retrieval; Organisation; Reflection

Product Universe (Figure 6.8) – this concept proposed a searchable database of design examples, which can be used for comparison when designing. It lists the critical dimensions of a catalogue of products, to give an insight into the sizes adopted. Each sample has images, video and full dimensions, amongst other useful data.

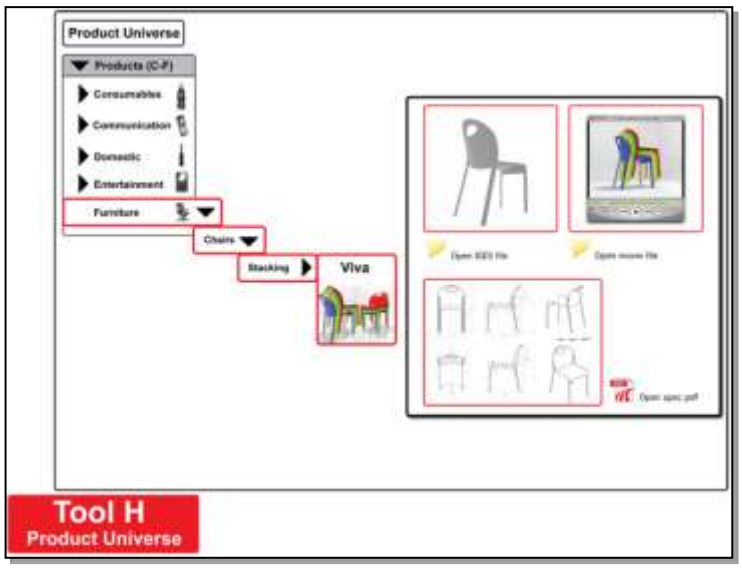


Figure 6.8 – Product Universe concept

Who was presented, in what format and the themes the concept explored are highlighted in Table 6.8.

Table 6.8 - Product Universe characteristics

Who	Averages drawn from existing designs
What	Derived measurements from comparable objects
Themes	Representation; Retrieval; Organisation; Reflection

6.2 Evaluation workshops

Before undertaking the workshops with recruited participants, a short pilot evaluation of the proposed workshop and materials being used was carried out with five design researchers from the 'Inclusive Design Research Group' based in Brunel University. This allowed some minor refinements (largely relating to format and presentation materials) to be made to the process and presentation materials before the workshops commenced. Once the pilot study was complete, two evaluation workshops with designers were organised to examine the tool concepts.

The proposition to participants during the workshops was that the tools should be considered readily available to be included in the design processes. What was being examined was how effectively they could work for the designers as a means of engaging with user information that reaches beyond their normal domain, in terms of interaction and access to new people based references, and in a way that would be considered both time efficient and productive.

The first workshop was carried out with a total of 23 designers, and focused upon student designer participants (i.e., 16 student designers, five academics in the field of design, and two professional designers), and the second workshop was carried out with a total of 20 designers and focused upon professional designers (i.e., three student designers, seven academics in the field of design, and 10 professional designers). This order was chosen as the professional designers were more difficult to recruit and had limited availability, hence it was felt that the more honed, second workshop would instil greater trust in the research being undertaken, and persuade designers to volunteer for later studies. Hence the following section will report on the second workshop, due to the more relevant professional focus, the first workshop being considered a test run.

For the second workshop invitations were sent out to 15 design companies via email and to the same combined number of specifically selected academics and students with experience in user-centred design. An overview of the study and

the goals were included in the invitations. Twenty participants attended the session citing a variety of reasons for attending, such as an interest in making new contacts/networking, gaining insights into the research and a general interest in contributing to new tool development.

The groups were invited to provide feedback on the tool concepts that were presented, by first individually rating each concept based upon initial impressions; second by discussing and rating each concept in teams; and third participating in co-creation exercises, where the best concepts/features from the concepts could be integrated into the designer's newly produced concepts of their 'ideal' tool. The sessions ran as shown in Figure 6.9.

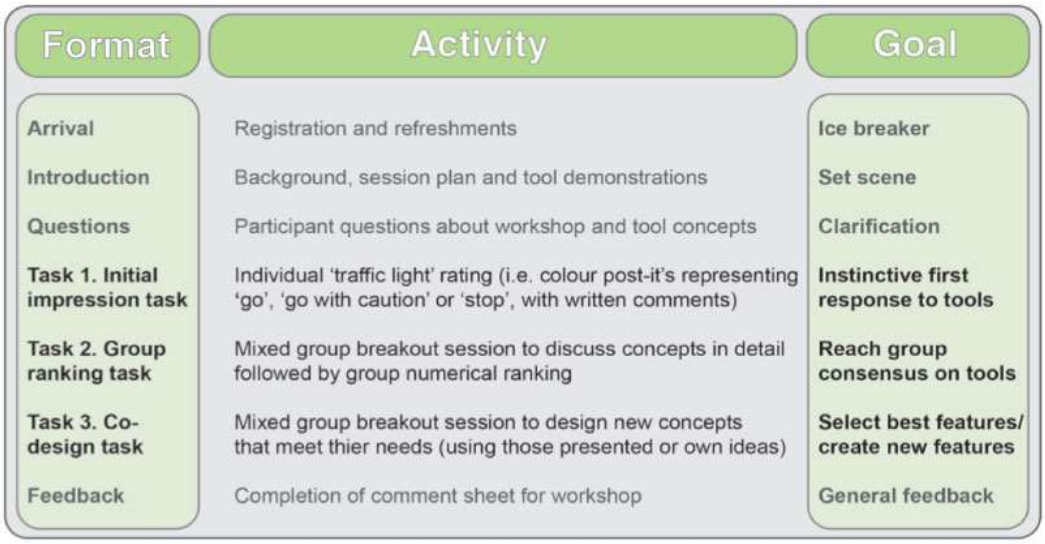


Figure 6.9 - Session schematic

The studies proved successful, producing a body of material for assessment and comparison. Participants appreciated the goals of the research, and engaged with the activities enthusiastically, the majority assessing the workshop positively in a feedback sheet.

6.2.1 Introduction to tools

Workshop 'packs' with required task materials were given to each participant, which included an overview of the project, tool descriptions, attendee list, 'post-its', and feedback forms. The session began with a presentation

introducing to the research and an overview of the themes in order to set the scene. The tool concepts were then presented by the author followed by a brief question session for any required clarification before moving onto the workshop sessions.

6.2.2 Workshop session task 1: Individual comments and feedback

The first task asked participants to carry out an individual feedback assignment by giving their first impression ratings of each concept tool using a 'traffic light' rating system of a - green 'post-it' to represent 'go' (i.e. yes), yellow 'post-it' to represent 'go, with caution' (i.e. maybe) and red 'post-it' to represent 'stop' (i.e. no). The participants were asked to write comments explaining their rating choice on each 'post-it' and place them on posters representing each tool, the goal being to assess which tools designers felt might be of benefit from first impressions and 'gut instinct', according to their own criteria of what might be useful for their work practices. The results of this session were used to create charts giving a quick indication of which tools created most positive initial interest, an example is presented in Figure 6.10 (right hand side) beside the original poster (left hand side) with participants post-it notes from which the results were derived.

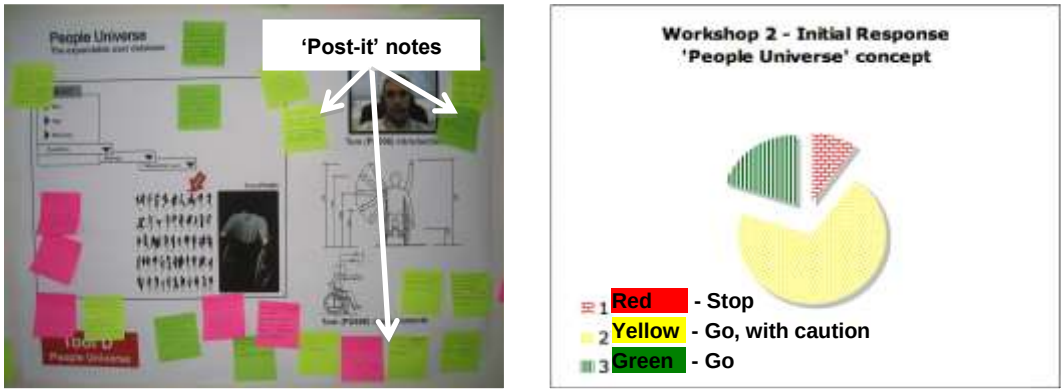


Figure 6.10 – 'People Universe' tool rating and derived chart of first impression feedback

6.2.3 Workshop session task 2: Group discussion and rating

After individual rating had been carried out, groups were formed to discuss each of the tools at greater length. Participants had been given a colour coded name-badge dependent upon their company and role; people with similar coloured tags were mixed to ensure that no table would have a particular background bias. The groups were asked to discuss and write down the pros and cons of each concept and then to award a star rating (1 being the lowest, 5 being the highest) to the concepts (see Figure 6.11 for this process in action).

Figure 6.11 – Group rating of the tool concepts

The tools ratings varied significantly. Those that were rated amongst the highest were 'ErgoLab', 'People Universe', and '3DPeople', and those were rated amongst the lowest were and 'ErgoCES' and 'Product Universe'. However, with these ratings there were suggestions for feature inclusions, exclusions and combinations. Some groups created their own rating systems, an example being a group that created their own additional rating under headings of 'usability', 'value to designer' and 'efficacy'.

6.2.4 Workshop session task 3: Co-design task

The final workshop task involved co-designing a tool concept, which formed a significant part of the workshop, acting as a tool for gathering feedback and eliciting need. Having been presented with the concepts to discuss and rate, the participants were then asked to remain in the teams which they had formed to create a new tool concept, borrowing and combining features from the tools presented or developing their own ideas to create a completely new concept. The goal here was to identify tool features that the designers would consider useful in a typical design process. The co-designed tools were later presented by the teams, allowing them to explain the features that they had included and the benefits that they predicted they might have for the design process.

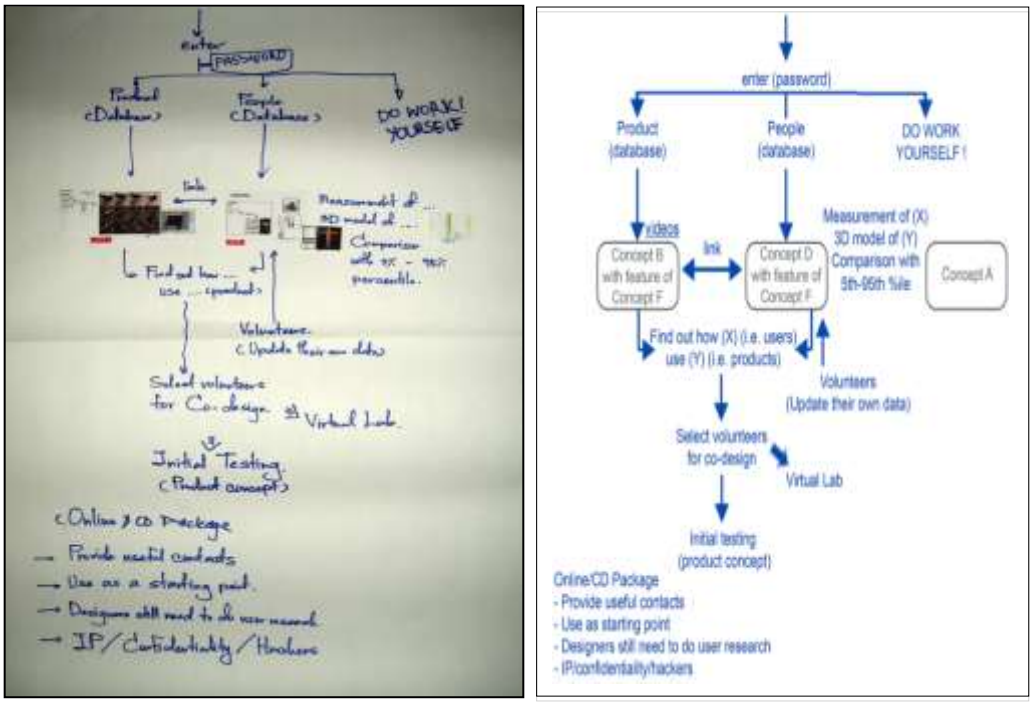


Figure 6.12 – Original co-designed tool and simplified schematic for clarity

The co-designed tools varied; however, consistent factors did exist. The example concept generated by one team (Figure 6.12) demonstrates several of the consistent factors, in that it combines the functionality of several (four) of the tool concepts: it stated that interaction with actual users could not be replaced by a tool (i.e. “designers still need to do user research”); there was a

desire for some conventional anthropometrics; a database of ‘real’ users (i.e. “people” and “volunteers”) was desirable as was a highly visual and interactive interface (i.e. the combination of the most visual interfaces presented).

6.3 Findings

The tool concepts proved very effective in stimulating discussion and engaging participants in a lively way throughout each session, which highlighted that the topic was both provocative and relevant. The comments presented in this chapter were all drawn from the professional focused workshop, as practicing designers are the focus of the study.

6.3.1 Initial ratings and comments

The eight tool concepts were deliberately diverse, in order to incorporate a variety of aspects of human information ranging from emotional characteristics to more anthropometric driven measurements, in both qualitative and quantitative formats. The original expectation was that this would polarise opinion and provoke more defined factions amongst the participants; however, the response demonstrated that there was value perceived in every tool, often relating to specific features, demonstrating that designers' data use can be wide and varied. Indeed this is considered necessary.

There was no outstanding preference for an individual concept based on initial ratings, and a significant difference in opinion between student and professional designers was apparent, as indicated in the Figure 6.13, except for in the desire for face-to-face facilities (i.e. a dominant feature of the 'Ergolab' concept, which rated highly in both workshops). The preference for different information for designers at different experience levels is to be expected, and the variance in designers of the same level of expertise may be due to the under-defined nature of what was presented, which resulted in a large number of 'maybe' responses. However, as mentioned previously, this was a deliberate strategy to encourage the designers to make such suggestions as to what would be needed to make a tool useful to their design process. When tasked with discussing in groups some consensus emerged; this will be discussed in the next section.

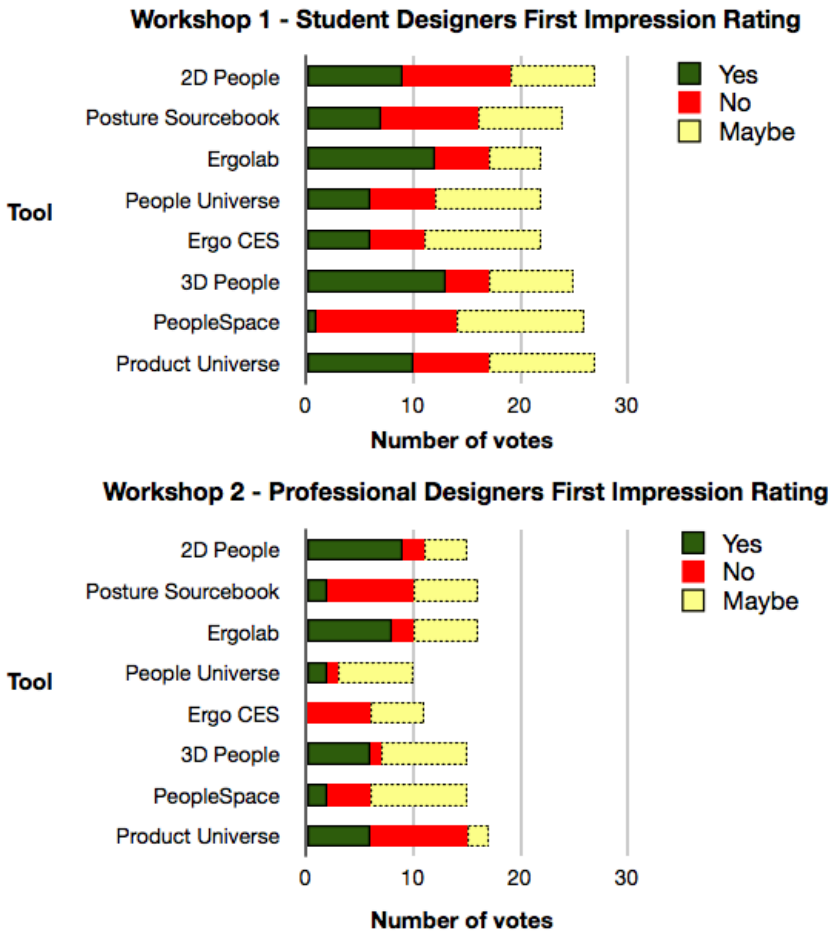


Figure 6.13 - First impression ratings of tool concepts

Tables 6.9-6.12 present illustrative comments from the initial 'first impression' task from tools that received the highest ratings. These comments illustrate the readiness designers demonstrated in making immediate and detailed judgements, regarding tool propositions. They highlight that it is essential that the tool is considered useful and intuitive, but also that designers have a range of needs from tools, there is not a one-size-fits-all solution.

Table 6.9 – 2DPeople examples of individual feedback

2DPeople – first impressions
Go: “Improves usability and flexibility of existing 2D methods of finding data which designers are used to.”
Stop: “These static people are totally unreal. Static. Naked. No context. No emotion. Just dimensions.”
Go, with caution: “I wouldn’t necessarily trust the contents. Would need to know where the data had come from.”

Table 6.10 – ErgoLab examples of individual feedback

ErgoLab – first impressions
Go: “A really useful tool: Real. Interactive. Comprehensive. Shared experiencing.”
Stop: “Will designers make the effort to go to this lab?”
Go, with caution: “Not sure how viable this could be? And not accessible to every one (e.g. what about designers in Scotland?)”

Table 6.11 – People Universe examples of individual feedback

People Universe – first impressions
Go: “I like the ease in which you can find specific target users. Would be nice if you could incorporate ideas from the other concepts, such as manipulation and drag and drop from 2D People.”
Stop: “How easy is it to use this software?”
Go, with caution: “If there was the chance for continued interaction and follow-up with the featured users.”

Table 6.12 – 3DPeople examples of individual feedback

3DPeople – first impressions
Go: “Very good idea, may remove the need for prototyping until later in the design process. Could be very time/cost saving.”
Stop: “Only good for people who can use both programs. So unless you know the software you can’t use it.”
Go, with caution: “This seems similar to SAMMIE and JACK. However inclusion of “conditions” e.g. poor vision is really good. Maybe fit into another concept?”

6.3.2 Group ratings task

For the group ratings task described in section 6.2.3, a more considered evaluation of the tool concepts was required, with a consensus between the members of each group reached and reasoning presented. The discussions and presentations were recorded and later reviewed, capturing key quotes for consideration in the subsequent development. The designers were asked to use star-shaped 'post-it's' provided to rate each tool: which resulted in the ratings shown in Figure 6.14)

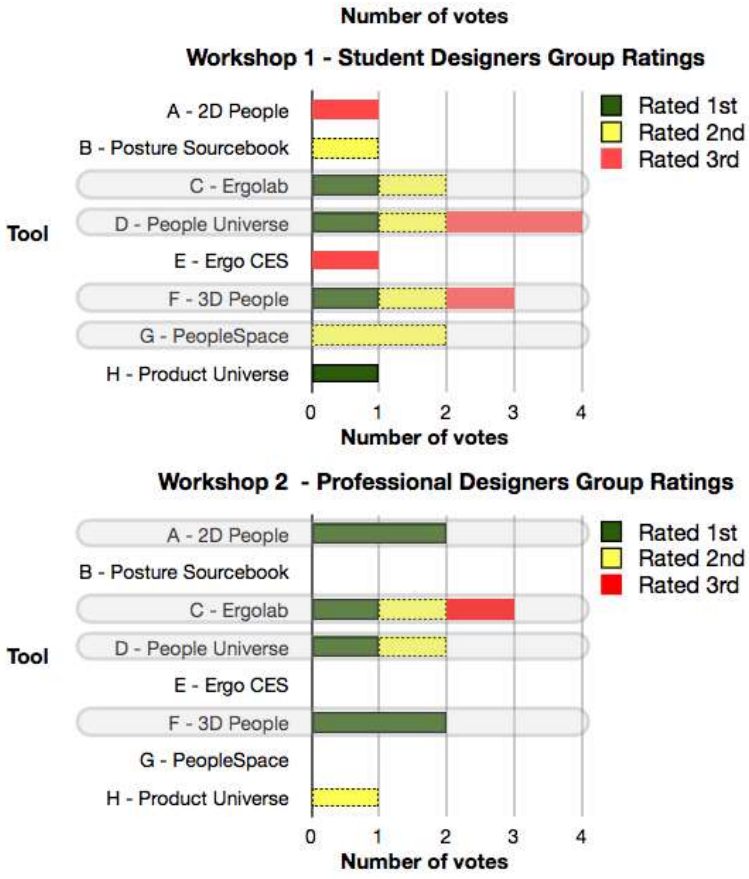


Figure 6.14 – Group rating of tool concepts

As can be seen several tools were given no rating, with these concepts being crossed out on the assessment sheet, and not further considered. This was not offered as an option, and only occurred in the professional designer session.

This was presumed to indicate a dismissal of the tools B, E and G (i.e. 'Posture Sourcebook', 'ErgoCES' and 'PeopleSpace'). Tools C, D and F (i.e. 'ErgoLab', 'People Universe' and '3DPeople') were in the top three in both workshops (as highlighted in Figure 6.14). Tool A (i.e. 2DPeople) was rated as a first choice by two of the professional groups, and tool G (i.e. 'PeopleSpace') rated as a second choice by two student groups; however, as PeopleSpace was dismissed by the professional group it was not considered for further development. Based on the three workshop tasks, concept elements were drawn from all tool concepts but particular focus was given to 2DPeople, Ergolab, and People Universe. The 3DPeople concept was dropped from consideration, as it was shown to closely resemble a variety of already available resources (e.g. PeopleSize, Hadrian etc.)

In the group rating exercise the recordings from the sessions were reviewed with key statements being taken in order to evidence choices. Tables 6.13-6.15 give examples of statements made during the group assessment, in relation to the most popular tool concepts. The comments demonstrate that some level of consensus was being reached; however, compromises and adaptions of the concepts start to emerge. The concept of 'real' people is also highlighted in all the preferred tools.

Table 6.13 - 2DPeople examples of group feedback

2DPeople – group discussion comments
"What I find interesting is that using that one and this one (tool A – 2DPeople and tool D – People Universe) you use them for initial predictions, but when it comes to further development you can't actually use them, you kind of have to be more specific, so as a guide that's fine, but when you want to go specific..."
"… for the designer to get a rough idea how big people are, so in that sense they are useful to give a rough or initial or preliminary size to work with…"
"I quite like the layout of that one (tool A – 2DPeople). It seems like you would be able to use it relatively easily."

Table 6.14 - ErgoLab examples of group feedback

ErgoLab – group discussion comments
"But is a lab the right place to do that or is it more important to go watch people using the thing in context."
"I don't know if it has to be a facility, the point is just to get the designer thinking about them and how they use spaces, they don't have to physically go somewhere maybe it's just an introduction they get online, it says start thinking in the real world, but you're in your office and it's up to you create a scenario create a situation and put yourself in it. The point is to get a designer thinking."
"We felt the lab could be used at two major stages, inspiration and evaluation. So you're inspired by the actual users but you have access to the raw data too to refer back to, sizes, videos, etc."

Table 6.15 – People Universe examples of group feedback

People Universe – group discussion comments
"This to me is a hell of a lot better. Well it's actual real people and your basing your design work on people that actually exist, so to me it's already a lot more genuine, you can trust your data more, cause you can actually see the person in it. Stuff like you have the guys there (tool A – 2DPeople) that's just generic, you know it's a generic distilled down thing, whereas this is an actual person so you automatically have a lot more empathy and understanding."
"I think a database is useful, if it can become more sophisticated as the product develops."
"I don't think you can come up with innovative ideas with generic data, I think you need to design for extremes and you need to think about what is the worst case scenario for this product, I'll go for a guy in a wheelchair cause he's like this, is this going to work for it, yes it can. If you can design for this guy (points to tool D – People Universe) you can easily design for this guy."

6.4 Workshops: Discussion and summary

The concept of a holistic tool which meets all human information needs in a design project is at best complex, and at worst both inappropriate and unusable. The criteria of an 'appropriate' and 'usable' tool was explored through the workshops. The participants clearly indicated a wide range of opinions and needs regarding human information provision, ranging from a desire for input to inspire the front end of the design processes, to the need for more refined and specific data, often gained from experiment such as might be required later in the process to provide specific detail. This also relates to what is being designed: the designers' needs from such a tool varies corresponding to the artefact of their brief, from those looking for insights into what might be pleasurable when using a piece of furniture, to being informed about the sizes to accommodate in order to meet the tight tolerances necessary for surgical tools.

This study focuses on professional designers and two standpoints became apparent, highlighting the differing needs indicated by student designers and professional designers: a tool might strive to educate the way a designer approaches a problem (more appropriate to student designers); or alternatively supplement their current methods (more appropriate to professional designers). Once a designer is within the professional domain, the various constraints of managing a business (e.g. time and resources) have been indicated as barriers to devoting time to learning new skills, therefore it is unrealistic to propose a tool that would require a significant change in behaviour. Such a resource would have more potential within the educational sector, where the concepts and considerations taught can be assimilated to become part of their thinking process during their professional career. Although the workshop included student designer participants (as a requirement of the larger EPSRC project EP/F032145/1), the focus of this thesis was professional

designers and the potential for support within existing design development processes.

It is clear that the uptake of tools will be in conjunction with existing preferences for experimental and face-to-face interaction. The professional designers focused on multiple modes of information communication, which would provide them with realistic representations of those they design for, a clear indication of the perceived value in obtaining an empathic connection; people are naturally predisposed to identify with people, not abstractions (Heath and Heath, 2009). The desire for realistic representations of real people was highlighted through several features of the tools that received high levels of positive feedback, such as visual impairment renderings, user videos, and figures based on real people. It can be assumed that this is due in part to the fact that these features go some way towards creating a truer 'human' representation.

There were some practical limitations imposed by available resources. As mentioned earlier, 3DPeople was not further pursued as it was felt such tools were already available, a position highlighted during the workshops. Additionally such a development was outwith the resources available for this research.

Similarly it was concluded that the 'Ergolab' concept as a physical space for assessment was a route that had already been taken by many institutions both professional and academic (e.g. Environmental Ergonomics Research Centre, Loughborough University) and as a physical lab-based resource would have limited accessibility in a geographic sense, and therefore would be limited in its potential to have a wide-ranging impact. As a concept it was also deemed most useful for design testing, which is carried out in later stages of design development, and the previous studies (i.e. Chapter 5) indicated that the greatest potential for an information and empathy resource to impact the design process was in earlier stages of development, as discussed in the following section.

6.4.1 When

Based on feedback from designer participants it was concluded that the preferred tools would be most useful at the front end of a design development process when exploring new user groups in relation to new briefs. Resources to support the front end of design development in terms of insight, information and inspiration are uncommon. In contrast to this participants considered the resource concepts suggesting more detailed numeric information, as only useful for later stages for detailing and refining to meet design specifications. Most participants considered such information to be currently available in a variety of existing tools such as 'PeopleSize', or would commonly take such measurements from those close at hand or on a comparable designed object.

The design process being more open and exploratory in the early stages means resources that provide broad information, insight and inspiration were considered potentially more useful, if communicating a selection of daily living experiences of a range of people. Such insights might be more applicable to a variety of issues but contain enough design relevant insights to influence the designers' considerations in meaningful ways. This implied that the information would have to be representative of typical daily activities of a broad range of people, and to be of more value to capture user types that were unlike those designers were familiar with or could easily access.

6.4.2 Who

The workshops highlighted that designers often mistrust information that is not connected to a familiar/reputable source or is at least easy recognisable as a 'real' person. This can be rectified through the use of realistic representation (such as pictures or video) of the people being measured rather than graphical representations. This format of representation was considered more engaging, in a similar way to 'raw' data, as both are perceived as more representative of

real people and their real needs. Similarly visually and factually out-dated data was a concern, which led to the supposition that designers when interacting with those they design for, would gain most benefit from a resource that could support this process. This would be achievable by providing a resource that structures and supports representation, retrieval, organization and reflection (RROR), allowing designers to updated contents with their own human information collections, a means of recording and consulting their findings for current and future design development projects. Further to this such a feature would satisfy designers' desires to be co-creators of the research.

6.4.3 What

There is an abundance of ergonomic and anthropometric data currently available; however, earlier studies (probes and interviews) identified and the workshops confirmed it is considered largely inflexible and difficult to apply. Data on its own is not enough; it needs to be understood and applicable. Even when relatively appropriate to a design project, the current formats were generally considered unattractive to designers. The way data is presented should make understanding implicit, and naturally build on the knowledge a designer already possesses. A major step is talking the designer's data language to allow them to add to the story of their design development in a natural way.

There was a desire for tools to have a familiar format, or alternatively to be intuitive enough that use would not require training or significant time to master. However, the designers wanted something that was distinguishable from what was already known to them in existing books, or the equivalent of a book re-interpreted for the computer screen. A web-based approach would be one appropriate means of achieving this, as a familiar, intuitive, flexible, interactive and potentially easily updated.

The tools offered a variety of information collections and formats, in the co-design tasks each team 'cherry-picked' what they thought was most useful, and suggested combinations of a variety of tools. This indicates that a fuller multi-faceted representation of end users is desirable. A combination of quantitative

data and qualitative insights, which can be utilised when desired, appears most desirable.

6.4.4 Summary

The overall goal of these workshops was to confirm the desirable qualities of a 'human information' tool through the concepts presented, and identify content and visualisation criteria deemed useful for future tool development. Feedback was gathered on tool concepts and information communicated from designers, and used to support the next stage of tool development and refinement.

Based on the data gathered and analysed from the workshops two of the concept tools (i.e. 2DPeople and People Universe) were selected for development in parallel, with the inclusion of real people interacting with real objects being prioritized, as suggested by the positive responses to ErgoLab and 3DPeople. The intent was to now produce a multi-functional tool that presents a variety of 'human information' resources focusing on real people, as this was a reoccurring theme in the feedback for all tools with comments such as –

"I like the more human, slouching etc."

"I would like more details about this person."

Additionally, feedback from the designers indicated that visualisation preferences could vary dependent upon the intended audience, internal presentation often being less refined, whereas material shown to a client must be more "presentable" and "professional". This is a consideration for the tool development as the focus is internal and as a tool to assist the designer.

The preferred resources suggest a supplement to the 'discovery' stage at the fuzzy front end of design development is desirable, where information need is highest and most diverse, as the problem and context develop towards definition.

The next stage of the development sought to explore these findings by gathering the types of information that designers demonstrated preferences for

such as ‘raw’ and ‘real’ data. The use of video and photographs were the primary means of achieving this in the concept tools, and manipulation proposals would be further explored through iterative development in a further workshop to check the resource was progressing in a desirable way, and then finally through an evaluation session, where the tool would be used in a concept generation session.

Chapter 7. Resource development and evaluation: The value of human information resources for concept generation

Findings from the previous studies suggested that a web-based resource would be received favourably by designers; the internet being identified as the most heavily utilised medium for early information collection. It was also verified as a preferred platform for designers when compared with less dynamic mediums such as books and computer-based software applications in Chapter 4. The proposed resource being web-based satisfied a variety of criteria deemed important by the designers through the studies in Chapters 5 and 6, such as being highly visual; interactive; accessible; relevant to established work modes; mixed media; and easily updatable.

This chapter will describe the process of development and critique of a web-based human information resource. Section 7.1 will describe the initial pilot visualisation and evaluation of the resource named MHIRROR (Means of Human Information Representation, Retrieval, Organisation and Reflection); which was carried out to check that the direction being taken to realise the content and structure of the resource was considered both relevant and viable by professional designers. Section 7.2 will go on to explain the development of a fully working web-based prototype of MHIRROR. Section 7.3 will explain the evaluation process of this resource undertaken with professional designers, and Section 7.4 the results. Section 7.5 will discuss these results and summarise the process of development and evaluation.

7.1 Premise of the resource

The resource was based upon human insights and physical characteristics, allowing quick browsing of material collected to represent a number of individuals, the intent being to provide material that could provide information, insights and inspiration through mixed media resources. A major strength of the resource being the quick way in which designers might intuitively explore a range of media connected to individuals, instantly gaining insights not only into their physical qualities, but also their lives. The resource is populated with a collection of diverse people, but beyond this a structure is provided offering designers the possibility of growing the resource themselves.

7.1.1 Pilot development and evaluation

As identified in Chapter 4 the framework developed for human information use in this study presented a means of representation, retrieval, organisation and reflection. A static web-based prototype resource was proposed largely based on two concept tools from the earlier trialled concepts (Chapter 6) these being 'People Universe' and '2D People', in addition to a focus upon the representation of 'real' people. The premise of the new web-based resource was that it would provide a platform for designers to interact with pre-existing human information datasets and input their own collections of human information based on real individuals. This would provide a structure with which to organise incoming human information (i.e. participants from their own projects) as well as accumulated people-based material from their previous projects, on top of a small collection of diverse individuals pre-loaded as initial exemplars.

As part of a study within a larger project (Dong *et al.*, 2011) the MHIRROR tool was mocked up as a series of proposed web pages (see Figure 7.1), providing a variety of insights into everyday people in everyday settings, combining elements of both information driven material (e.g. material such as

measurements) and empathy driven material (e.g. material such as images of home environments), under several headings such as ‘overview’, ‘measurements’ and ‘home images’.

Figure 7.1 - MHIRROR resource mock-up

The study allowed designers to critique the content and format and suggested feature changes and amendments, while considering a selection of existing and established information resources relating to people-centred design.

7.1.2 Pilot comparison/critique

Before developing the tool as a fully functioning online resource, the pilot comparison/critique allowed assessment of whether the directions proposed were perceived as valuable by designers, when compared against existing tools and resources. Tool evaluation workshops were carried out with both professional designers and design students, to assess their interest in using a range of tools, exploring details such as what features they like when using inclusive design support tools, at what stages they would use such tools, and how useful the tool was to them.

MHIRROR was compared with four existing tools and another concept tool named ErgoCES selected for the critique. The main selection criteria for the existing tools used in the critiques was their known availability and their broad range of formats. The tools included were as follows -

Design for Ageing Network (DAN) Teaching Pack (Hewer *et al.*, 1995) - A resource folder incorporating age-related issues into design courses.

ErgoCES prototype (developed by the Inclusive Design Research Group, Brunel University) - A searchable database with people and product information - allowing comparative visualisation.

Impairment simulators - A physical toolkit simulating visual, dexterity impairments and stretching restrictions. (Available to buy or borrow from the Cambridge Engineering Design Centre)

Inclusive design toolkit (available at: www.inclusivedesigntoolkit.com) - An online toolkit with comprehensive information, and a tool for design exclusion calculation.

Innovating with people (Norwegian Design Council, 2010) - A book with introduction to how inclusive design can be used as a strategy for business, through practical guidance and case studies.

Pilot evaluation

Five professional designers (that had not been involved in earlier studies) participated in the workshop on a voluntary basis. The participants were asked to interact with each tool for 10 minutes and fill out evaluation forms ranking them from 1-10 (1 being least useful, 10 being most useful), the results from which can be seen in Table 7.1. This was followed by a short questionnaire.

Table 7.1 - Results from pilot evaluation

DAN Teaching Pack  *(see next page)*	Designers' feedback: The main features liked included: simplicity of format, not overloaded with information. Clear problem statements with recommendations for design strategies. Case studies. Useful for someone who is unaware of or new to inclusive design, useful for defining user direction. Scores: (3 - 6) - Average score: 4.0

ErgoCES 	Designers' feedback: The main features liked included: rich data, specific data, getting targeted, easy to 'drill' down interface; filter – get what you want & no more. Useful for new product design, to get specific data of a specific set of people; much later in the design process at the design detail stage, maybe to validate. Scores: (3 - 7) - Average score: 5.0
Impairment simulators 	Designers' feedback: The main features liked included: 'goggles and gloves': easy to understand and quickly get an empathy (but the restrictive harness is difficult to work out), looks good (but also expensive). Useful for presentations and for specific projects that need to get into the shoes/mindset of the users. Scores (1 - 6) - Average score: 3.7
Inclusive design toolkit 	Designers' feedback: The main features liked included: overview, interactive, good navigator, case studies (if more + updated), useful for business case, web-based/easily accessible, free, exclusion calculator, excellent user capabilities (but lost among rest of content). Useful when learning about inclusive design and building a business case. Scores (2 - 7) - Average score: 4.2
(see next page)	

Innovating with people 	Designers' feedback: The main features liked included: the business perspective, Interesting coffee table read, good presentation of tools and methods, does not require learning or new skills, looks fresh, very modern and attractive book design. Useful for people who may not know much about inclusive design, probably a client for interest. May give context to research. Scores (2 - 7) - Average score: 5.6
MHIRROR 	Designers feedback: The main features liked included: pictorial, modern, people-based, quick, personas, accessible interface, search option, "living breathing ethnography meets anthropometrics". Useful early in the process to have a feel for the users, to create innovation from inspiring footage of real users' problems, to create and backup personas, to demonstrate needs to clients and excite clients. Scores: (4 - 9) - Average score: 6.4

Based on the results, continuing development of the MHIRROR resource was considered appropriate, particularly as it was rated highest by the professional participants, which indicated genuine perceived need and value over feeling obliged to rate the resource generously as it was a concept proposed by the researchers.

The designers were particularly enthusiastic about the potential to go beyond relaying lifeless information, through maintaining some rawness of real life detail gained when actually meeting those being designed for. This approach was considered to potentially enhance empathy and understanding of people, rather than presenting contrived averages or personas, which designers have demonstrated mistrust of in previous studies (such as the Chapter 4 interviews).

7.1.3 Moving forward

This preliminary critique made it apparent that delivering information in a format appealing to designers is critical. Potential was evident in communicating some more conventional people-based information (such as measurements) when supplemented with mixed media resources involving the people these measurements relate to, which is considered more real and engaging. A major need identified is communicating in a data language that works for the designer and allows them to add to the narrative of their design development in a natural way. There was particular interest demonstrated in taking advantage of some of the communication mediums (particularly video) that are becoming increasingly feasible for effective use in the design process due to technological advances in file size and speed. Capturing and presenting real people and their real lives to designers, was considered an effective method of enhancing the information and empathy.

This session provided a wide range of feedback from the designers, as might be expected many of the comments related to style and layout –

“I like it, but I don’t like black backgrounds; they make things difficult to read, that would actually put me off using the site.”

Further feedback indicated that several rules of graphic/web design should be adhered to, to help avoid unnecessary negative distraction. These related to issues of typography such as keeping text simple and consistent, minimal use of colour and appropriate font selection.

The next goal of the research was to develop a fully working web-based prototype of MHIRROR, pre-loaded with the human information relating to several users, in order to evaluate the premise. Four primary ‘human information’ functions would be explored:

Representation – represent human information in ways that promote understanding

Retrieval – allow designers to efficiently retrieve human information

Organization – allow designers to store, access and cross reference human information

Reflection – promote designers reflection upon human information within their process

7.2 Developing and evaluating the 'MHIRROR' resource

The previous research and findings from the pilot study indicated that a web-based resource was likely to be accepted by designers and fit effectively within their existing information processes. Hence, the next phase of development was to embody the hypothesis that human information resources can support a people-centred design, through compiling human information content into a web based resource for use in design tasks and evaluation. In order to accomplish this it was necessary to: 1) collect human information from a diverse group of people, and 2) compile the human information into a web-based resource.

7.2.1 First attempt at human information collection

An attempt was made to capture data from participants in a public engagement workshop. As time was limited the approach taken was to select a range of individuals for casual interview against a scaled backdrop (used to capture a rough indication of measurement and scale) as shown in Figure 7.2.

Figure 7.2 - First attempt at human information capture

However, due to the nature of the workshop and the focus being on engaging the participants as multi-generational teams, the data collection proved difficult, and the material collected of inconsistent quality in terms of both content and clarity (the video, audio and image) and limited value as the people and objects discussed were out of context. The nature of the workshop, with its

focus upon the young and the old ends of the age spectrum also meant that the participants fell broadly into very similar categories (i.e. 12-14 years of age and 60+). Although not used further in the tool development, the data gathered during this session was useful in helping determine better approaches for future content capture (and issue of importance such as clarity, consistency and context). However, in order to get some later value from the exercise contact details were collected from interested individuals, the plan being to contact them at a later point to arrange further content capture in context (i.e. their homes) and in a more controllable environment (one-to-one).

7.2.2 Second attempt at human information collection

The first failed attempt highlighted the need for a more defined approach, and that diverse candidates should be purposely selected to best examine the concept. As the goal of the resource was to motivate designers to consider beyond limited groups (e.g. themselves and people connected to them), a group of six diverse people were specified, presenting a broad range of ages and broad selection of individual characteristics, lifestyles and conditions that might be relevant for design consideration. These individuals recruited were broadly classified as –

An athletic user

A visually impaired user

A pregnant user

An elderly user

A mobility challenged user

A user with a busy lifestyle

As the goal was to broaden the scope of people-related thinking and challenge assumptions they may have about user types, the individuals were selected based on having the characteristics listed above, but beyond that having relatively outgoing personalities, and not matching stereotypes relating to their

condition or at least able to communicate their life as multi-faceted. The individuals were recruited based upon recommendations from friends and colleagues. The process from initial contact to carrying out the interviews and measurement sessions was approximately one month, which allowed time to prepare the questions and plan the sessions.

To minimise inconvenience to the participants and to make the process replicable within a designer's typically limited time availability, the content capture process was planned to last no more than one hour. This was dependent upon the time required by participants to carry out the prearranged activity of daily living (ADL), which for the purpose of this study was to prepare a cooked breakfast using food provided by the researcher (in compliance with any specific dietary needs or preferences of the participants). In one case this time limit was exceeded as the candidate with low vision took approximately 45 minutes to complete the task of cooking a full breakfast, which led to the session over-running by approximately 30 minutes.

The procedure typically consisted of firstly arrangements being made to visit the participants at their home at times when they might typically cook a breakfast. The researcher would begin by introducing himself, the project background, what would happen in the session and how the material would be used, before supplying a consent form to be signed, which also presented these details (see Appendix G) in addition to a form asking for basic profile information (e.g. name; age; weight; etc.). Next for speed and minimal imposition, pictures of the candidates were taken against a scale, to allow later measurements to be made. At this point a video camera was set up to record candidates response to a series of questions relating to lifestyle and personality, which was proceeded by a tour of their home, during which the researcher took pictures of each space. Finally the activity (i.e. cooking breakfast) was carried out, which was video recorded.

7.2.3 Compilation

The captured material consisted of observational, interview and measured information, which were edited and compiled into themes in a consistent way to form the basis of the MHIRROR resource content. The themes were selected to offer a combination of both information (biographical and physical measurements) and empathy (life and lifestyle insights), which were presented in mixed media formats.

7.3 Website construction

The website was developed using Macromedia Dreamweaver version eight, which was recommended to the researcher by web design professionals based upon its learn-ability and the intended content. The website used hyperlinked pages of html (hyper text markup language) over database structure. This was deemed adequate for the evaluation; however, it was noted that this would limit some of the functionality such as keyword searches, which might be identified as a concern by evaluation participants. If this was the case, this would form part of the specifications for future development of resources.

The video footage was captured using a Panasonic PV-DV200. This camera was selected, as it was the only video recorder available through Brunel University stores that recorded in non-tape based digital format. It was hoped it would be more efficient as the need for conversion from tape would be eliminated. Unfortunately the file format in which the video recorder captured material was incompatible with the computer being used (i.e. Apple Macintosh Powerbook G4) and the sound would not playback on the clips, therefore an additional conversion process was required. A piece of software called MPEG Streamclip was used to convert the files into a format that would be editable in terms of audio and visuals. Once edited using Quicktime Pro software a final conversion was completed using software called Sorenson Squeeze which allowed the file size to be massively reduced through conversion to compressed flv files, which can be easily played by flash players commonly used for internet browsing.

Website design

Software packages, 'Photoshop' (to enhance images), 'Illustrator' (to align and arrange images) and 'Comic Life' (to story board and annotate images) were used to edit all of the still images into clearer and more coherent formats keeping with the style of the MHIRROR website (Figure 7.3).

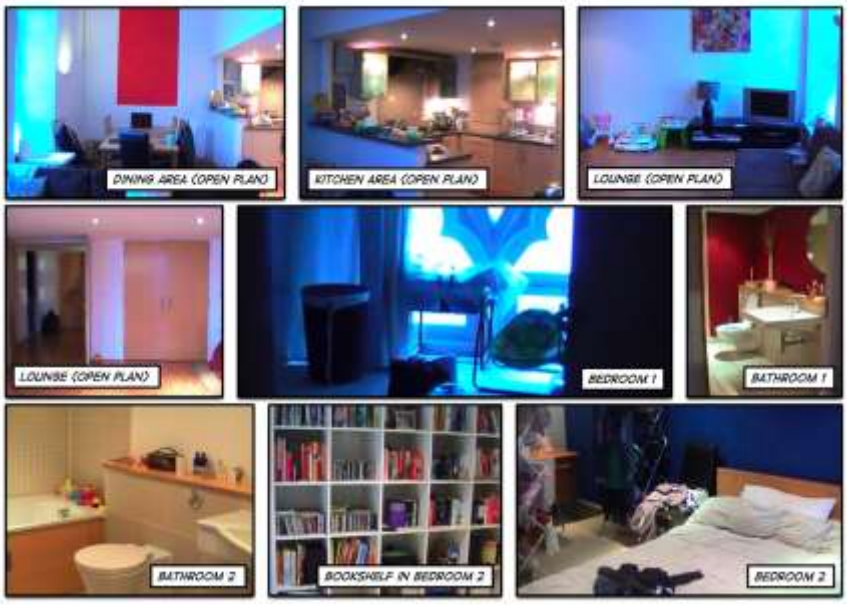


Figure 7.3 - Comic life representation of home environment

To ensure easy site navigation, usability was a concern, particularly in order to allow focused testing and evaluation, without too much distraction due to the site being unrefined. To overcome this to some degree a linear website schematic and concept layout sketches (Figure 7.4) were drawn up to explore the potential website configuration.

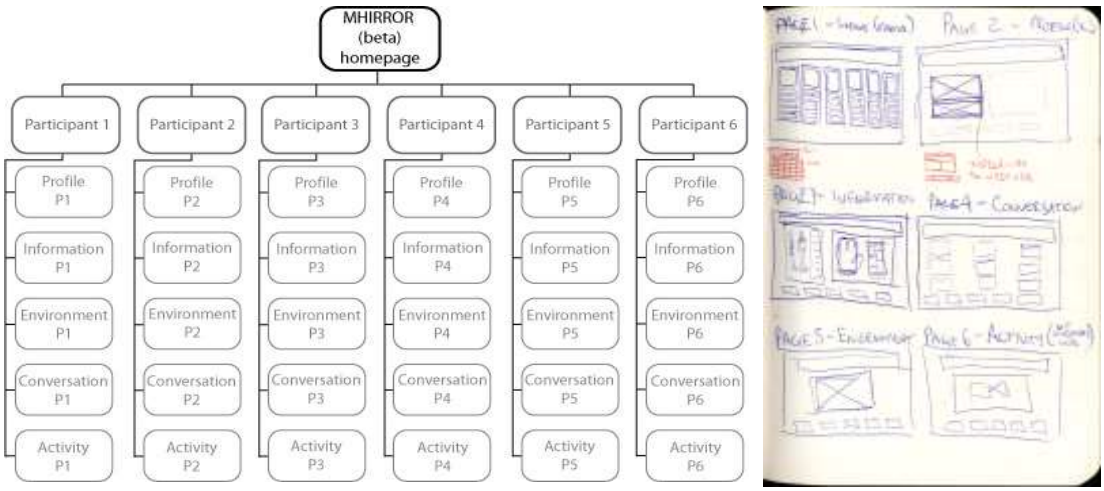


Figure 7.4 - MHIRROR website schematic and layout concept

This ensured the site was designed in a consistent and clear manner. This was achieved in a number of ways particularly through the use of 'white space'

(Katz-Haas and Truchard, 1998). The homepage displayed an overview of the full site contents. Each profile contained the same nature of information under the same section-titles. The home page could be returned to at any point by clicking upon the 'MHIRROR beta' icon at the top of every page. Navigation within the site was extremely simple and consistent. Once inside an individual's section the various categories could be browsed relating to that individual, to exit from that individual's section the user would just click the 'MHIRROR beta' icon that was always at the top of the page, and they would return to the homepage where a menu of full contents on each individual would be presented again.

The homepage (Figure 7.5) was the first page presented when users entered the site, giving users a full overview of the contents of the site. From this page users could access any individual participant and any theme relating to them on the site.

Figure 7.5 - MHIRROR homepage

From the homepage the content categories available within the site being 'profile', 'information', 'conversation', 'environment' and 'activity', descriptions of each of these follow.

Profile (Figure 7.6) - the user's basic biographical details (images and text). This page gave a quick overview of the person through a close up image of their face and hands, and general information such as age, occupation and nationality. It delved into more representative information with details relating to home and health.

Figure 7.6 - MHIRROR 'profile'

Information (Figure 7.7) - the user's basic physical measurements (scaled images and text). This page gave an overview of basic measurable information, detailing height, weight and basic measurements, as well as providing scaled images of full body and hand, from which further measurements could be extrapolated. The original hand and body images were photographed next to a scale, which was later replaced with a clearer scale on the images to allow a clear indication of dimensions from which further dimensions could be extrapolated (Figure 7.8).

Figure 7.7 – MHIRROR 'information'

Figure 7.8 – Original hand image against scale and edited version

Environment (Figure 7.9) – the user's home environment (images and text). This page provided a pictorial guide to the rooms of their home, from which further details could be deduced regarding interests, lifestyle, taste etc.

Figure 7.9 - MHIRROR 'environment'

Conversation (Figure 7.10) – video footage of the user's responses to life and lifestyle questions (video and text). This page included clips where the participant gave details to a set series of questions, such as 'describing myself', 'a day in my life', and 'a design that improves my life'.

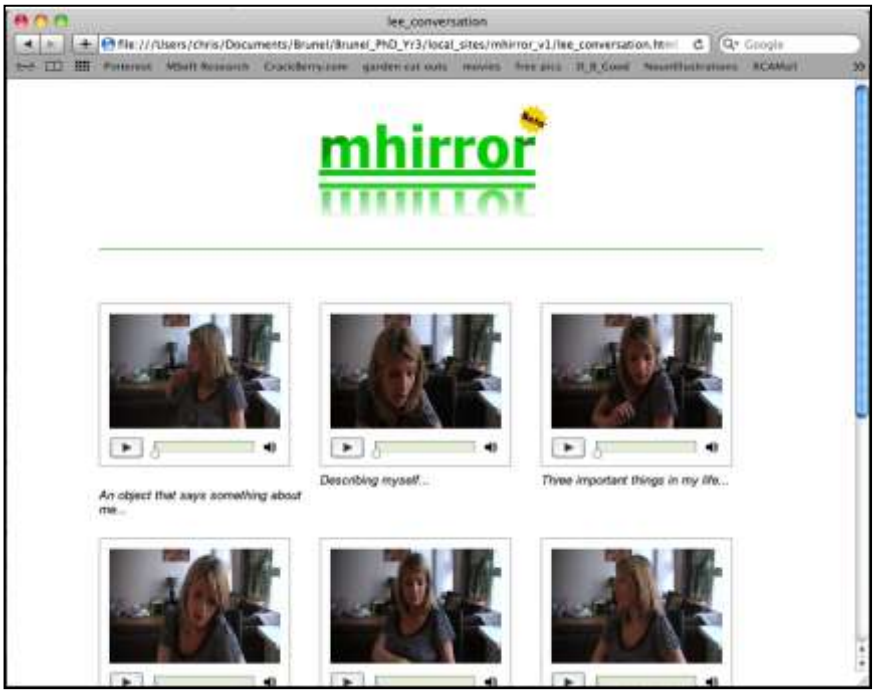


Figure 7.10 - MHIRROR 'conversation'

Activity (Figure 7.11) – the user performing an activity of everyday life (video and text). This footage captured the participant in their own kitchen preparing a meal, using their own facilities and equipment. This was the pre-selected everyday activity that would relate to later assessment with professional designers.

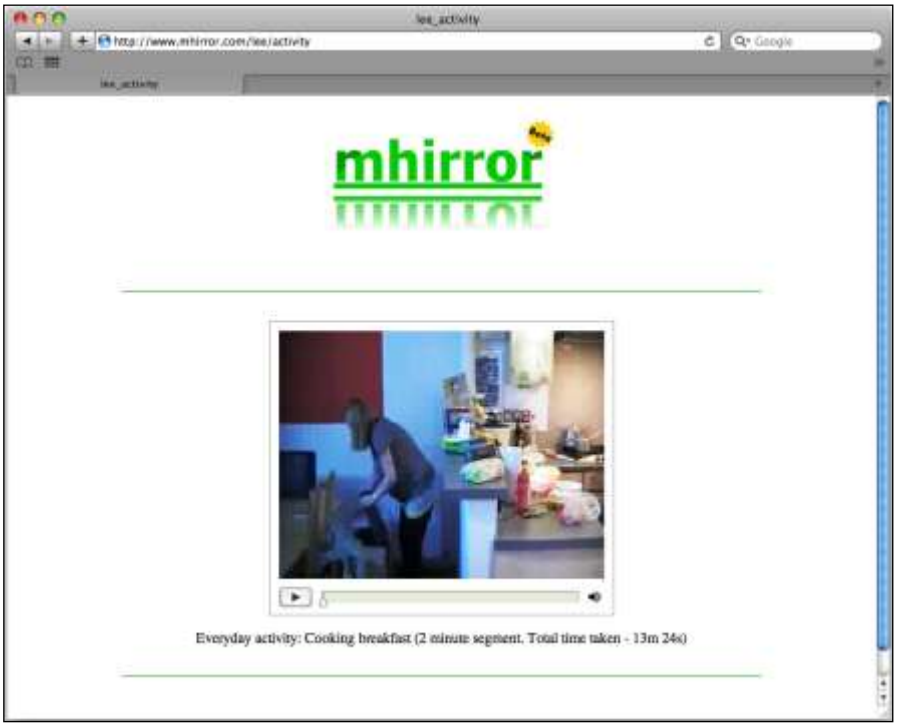


Figure 7.11 - MHIRROR 'activity'

7.4 Testing process

Once the working prototype of the MHIRROR resource was developed testing was carried out through a workshop with six designers based at the Helen Hamlyn Centre for Design. The workshop took the form of a pre-evaluation task, informal guided brainstorming (Osborn, 1953) post evaluation questionnaire and a 'desirability card' exercise. It was held within the Helen Hamlyn Centre studio space in order to keep the environment familiar. The evaluation proved to be positive overall and useful feedback and critique was gathered.

The brainstorming task had a short time-scale, which added a degree of urgency to the process, which of course is common to commercial design, and was cited as an issue of concern in the earlier interviews (Chapter 4) as a barrier to user based investigations. The designers were asked to respond to a broad brief, creating concepts referring to the information contained within the resource. The intent being to later assess whether the resource provoked designers to move beyond ingrained thinking (Gill, 2009) and the pre-established references implied by brief, to start to think about the intended users on a deeper level (i.e. lives and lifestyles) through information and empathy. Predominantly commercial design is a redesign process (MIchl, 2002); hence the task asked the designers to brainstorm concepts for an everyday product that would fit into everyday life, the theme chosen was 'recycling in the kitchen'. Osborn (1953) recommends quantity in brainstorming sessions, as this is most likely to produce a 'winning' idea, an approach also common in top consultancies such as IDEO (Sutton and Hargadon, 1996), hence the instructions for this task also encouraged quantity to align with expected norms. There was no formal evaluation of quantity or quality of the designs produced during the brainstorming session, as it was not the purpose of the study. Brainstorming was selected as a familiar ideation technique used early in the design process where intuition is employed, to examine whether having the MHIRROR resource at hand was considered useful in bridging the gap between existing knowledge and meeting actual users. In this way the session would be indicative of how the resource would be used in the real world.

The tasks were carried out by one designer per one-hour session, to allow a more focused session in which the designer would be limited to their individual intuition and personal references, and if requiring more input would have to use the MHIRROR resource. Although brainstorming sessions are typically undertaken in groups, there are a number of reasons why this can produce limited insights in a session such as this evaluation. Of particular concern was 'production blocking' (i.e. more people participating allows less opportunity for individual contribution) and 'evaluation apprehension' (i.e. apprehension that peers will adversely judge contributions) as identified in (Diehl and Stroebe, 1987).

The resource was not developed to test a flawless website, but instead to test the hypothesis in terms of content and framework; however, some attention was given to factors such as navigation, presentation and consistency when developing the resource so as not to detract too much from the content and functionality of the resource and its potential to support designers. The resource was presented as 'MHIRROR beta' to emphasise that it was work in progress that would be further refined.

The sources of inspiration and information that influence design thinking perform a variety of important functions that aid idea generation, through establishing context and anchoring mental representations (Eckert and Stacey, 2000).

The designers/participants assessed the resource through a questionnaire and brief interview assessing how it had assisted their process of concept creation. The assessment was based upon the value of the information and empathy they could extract through four 'human information' functions embodied within the various sections of the resource, these functions being –

- Organization

- Reflection

- Representation

- Retrieval

Each of the four tasks were introduced by the researcher prior to each commencing, to avoid overloading the participants with too much detail (Jones, 2003). A pre-session question generation task was used to examine whether the MHIRROR resource provided information that aligned with what designers naturally seek, by asking the designers to list at least ten things they would like to know about the people they would be designing for. This exercise also worked as a 'warm-up' before the idea generation, which is recommended for successful brainstorming (Wilson, 2006). In order to narrow the scope of the question generation task the designers were given limited detail about the environment (i.e. domestic) and the market (i.e. mass market), but were not given any further indication of what the brief might be. The brief for the brainstorming task was then presented immediately before the session began to prevent any pre-task research or priming by the designers. This way the designers were limited to only their intuition and experiences and the contents of the MHIRROR resource.

7.4.1 Evaluation results

The evaluation looked to explore how readily the designers adopted the MHIRROR resource, and if it was considered a desirable addition/influence on their process, which they would consider using in the future. The problem context was intentionally selected to be a familiar everyday environment, the aim of this being to test whether the resource would assist designers in considering a variety of diverse users needs, beyond their own experiences and knowledge. The MHIRROR prototype gave the participants an insight into a variety of users and their various natural contexts, in essence a combination of material that designers could consider towards gaining a 'deep understanding' (Dong and Vanns, 2009).

There were three techniques of evaluation; the first tasked designers to tackle a simple brief using the MHIRROR resource; the second was a questionnaire filled

out in relation to the resource; and the third was through the use of a desirability card task.

7.4.2 Process of evaluation

Six design staff from the Helen Hamlyn Centre for Design were selected for evaluation, due to the centre being a recognised Centre of excellence in inclusive and people-centred design approaches. This 'purposive sampling' (Denscombe, 2007) allowed the evaluation to be carried out by designers with characteristics of interest to the study. It was considered important to consult designers that were already well versed in the concept of people-centred design, as they could give an expert critique of the resource and its effectiveness in delivering valuable human information, insight and inspiration to enhance people-centred design. The assumption being that if a group of experienced people-centred designers considered the resources useful to their process already having substantial knowledge of the domain, then it would most likely have value for designers aspiring to design in more people-centred ways.

A one-day session (seven hours) was agreed with the Deputy Director of the Helen Hamlyn Centre. This allowed access to the designers, and testing within their natural environment (i.e. soundproofed space they use within the studio for tasks such as group meetings and concept generation sessions). Six participants were selected based on the criteria of being ‘experienced’ designers within the studio (i.e. at least three years of professional design experience).

The participants were contacted through email prior to the testing session, providing a brief introduction to the researcher and the area of research, and explaining the session was part of a larger study looking at supporting people-centred design through information and empathy. It further explained that this particular session would be used to evaluate a prototype web-based resource. They were informed the individual sessions would take approximately one hour per person and would consist of the following tasks -

- completion of a consent form and short pre-testing questionnaire

- brief introduction to the prototype resource

- brainstorming session addressing a hypothetical brief

- post-session evaluation

- desirability card exercise and brief interview

A suggested timetable of individual appointments for the day was provided, with the suggestion of swapping amongst one another if any of the timings were unsuitable (and informing the researcher prior to the day of any such changes).

On the day of evaluation the researcher arrived 30 minutes prior to the testing session, to set up the space laying out the various materials and checking the website was accessible. Food and beverages were provided for the session to allow the designers to snack as they completed the tasks and also acting as token reciprocity for agreeing to participate.

7.4.3 Overview of the brainstorming session

The interview described in case study one (Chapter 5) highlighted the designers revelation that briefs delivered to designers can often be very minimal, frequently condensed down to a single sentence from which they have to proceed to refine the issues and generate concepts. Keeping in line with this pattern the brief for the task posed a one-sentence challenge –

“Brainstorm ideas for a kitchen-based concept with mass-market appeal, that could improve people’s habits with food waste.”

There was no prescribed way for the designers to use MHIRROR, they were left to interact with it in whatever way seemed natural to them; the resource was made available alongside the brief for the session, the only constraint was the time limit (i.e. 20 minutes) they were given within which to brainstorm as many ideas as possible.

The participants were given a variety of materials (e.g. range of paper sizes, post-it's and selection of pencils, pens and markers) to capture their concepts, and the MHIRROR resource was made available on a provided Macintosh 'Powerbook' laptop (Figure 7.12).

Figure 7.12 - Participants working with the MHIRROR resource

7.5 Results from brainstorming using MHIRROR resource

In approaching this brainstorming task three approaches were apparent: some participants immediately produced concepts based on their instantaneous understanding and tacit knowledge relating to the brief statement, with no reference to the resource until they had expended their instinctive responses, at which point they would refer to the MHIRROR resource to draw out further ideas. Others chose to use the resource immediately, exploring it at length before beginning to compile ideas. The final remaining participants dipped in and out of the resource generating ideas as they proceeded.

There were two distinct and evenly split approaches to expressing concepts – pictorial and textual. Fifty percent of the participants sketched images to represent their ideas, later annotating them for clarification after the sketch was complete, the other half of the participants took a written approach where they made notes and produced written lists of concepts (Figure 7.13). One participant's first action involved making extensive notes about the categories on his concept sheet, before generating concepts.

Figure 7.13 - Participants produce concepts visually and textually

7.5.1 Overview of resource use

The researcher took notes and monitored in detail each participant's interaction with the resource (i.e. categories selected, users selected, frequency and timings). Generally the participants took the initial approach of a quick overall perusal of the five categories (profile, information, conversation, environment and activity). This then led to them spending most time on categories that they decided they would get the most usable material from within the time constraints of the task – which varied depending upon individual participant, but predominantly led to gravitation towards the video data located on the 'conversation' and 'activity' pages (see Figure 7.14).

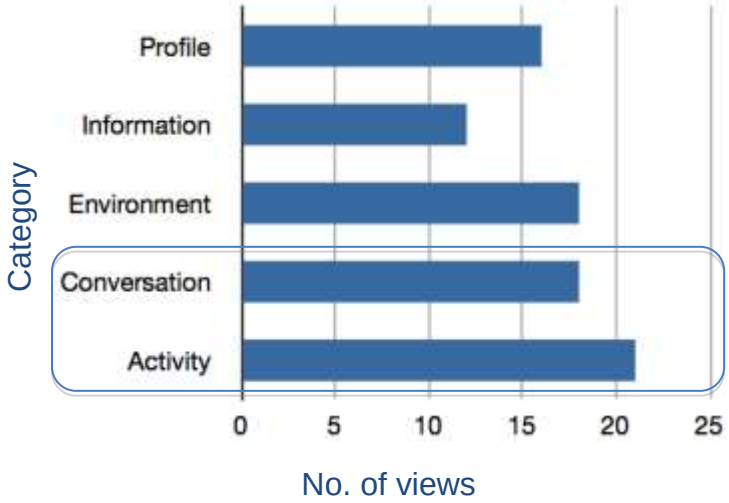


Figure 7.14 - MHIRROR category views

The designers spent most of their time watching the two-minute 'activity' clips that presented footage of an everyday task carried out in the environment relevant to the brief (i.e. the kitchen). Unlike the other categories participants spent some time on these pages watching the clips in their entirety (i.e. 2 minutes per user). The 'conversation' video clips were the most used, with the designer's watching a minimum of five clips and a maximum of sixteen clips each (Figure 7.14); however, as these clips tended to be brief, this did not take up as much time as the 'activity' viewing. Often after watching clips the designers took a quick look at some of the other sections, these tended to be

either the ‘profile’ or ‘information’ to fill in some more details about the individuals. The use of ‘environment’ was again split, with fifty percent of the participants referring to this section numerous times (between three and seven times) whilst the other half only referred to it once. ‘Activity’ being chosen as it was perceived to give the “most insight per time spent”. ‘Information’ was the least used category, most participants perceiving it as too detailed for their needs at the concept generation stage.

Four out of the six designers produced four concepts, one produced six and the remaining participant produced seven, however, this was not the criteria of evaluation and appeared to be more a reflection of the designer’s natural work-rate.

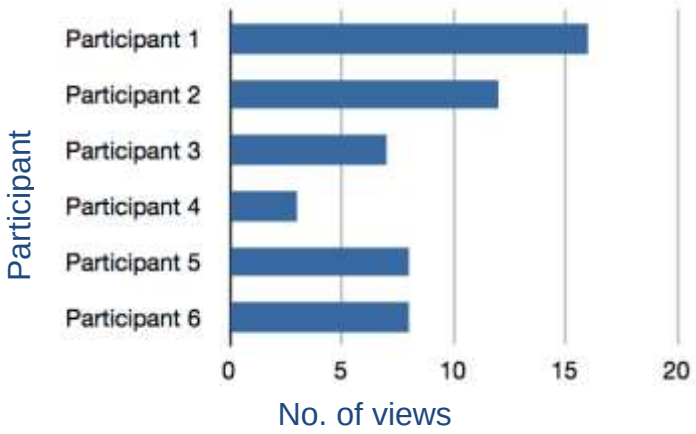


Figure 7.15 - Conversation clips watched

7.5.2 Navigating the resource

Although each participant made good use of the resource, there was significant variation in designer’s approaches (a full record of the navigation steps can be found in Appendix H) in using the resource. A summary of the pattern of use for each participant using the resource can be seen in Figure 7.16.

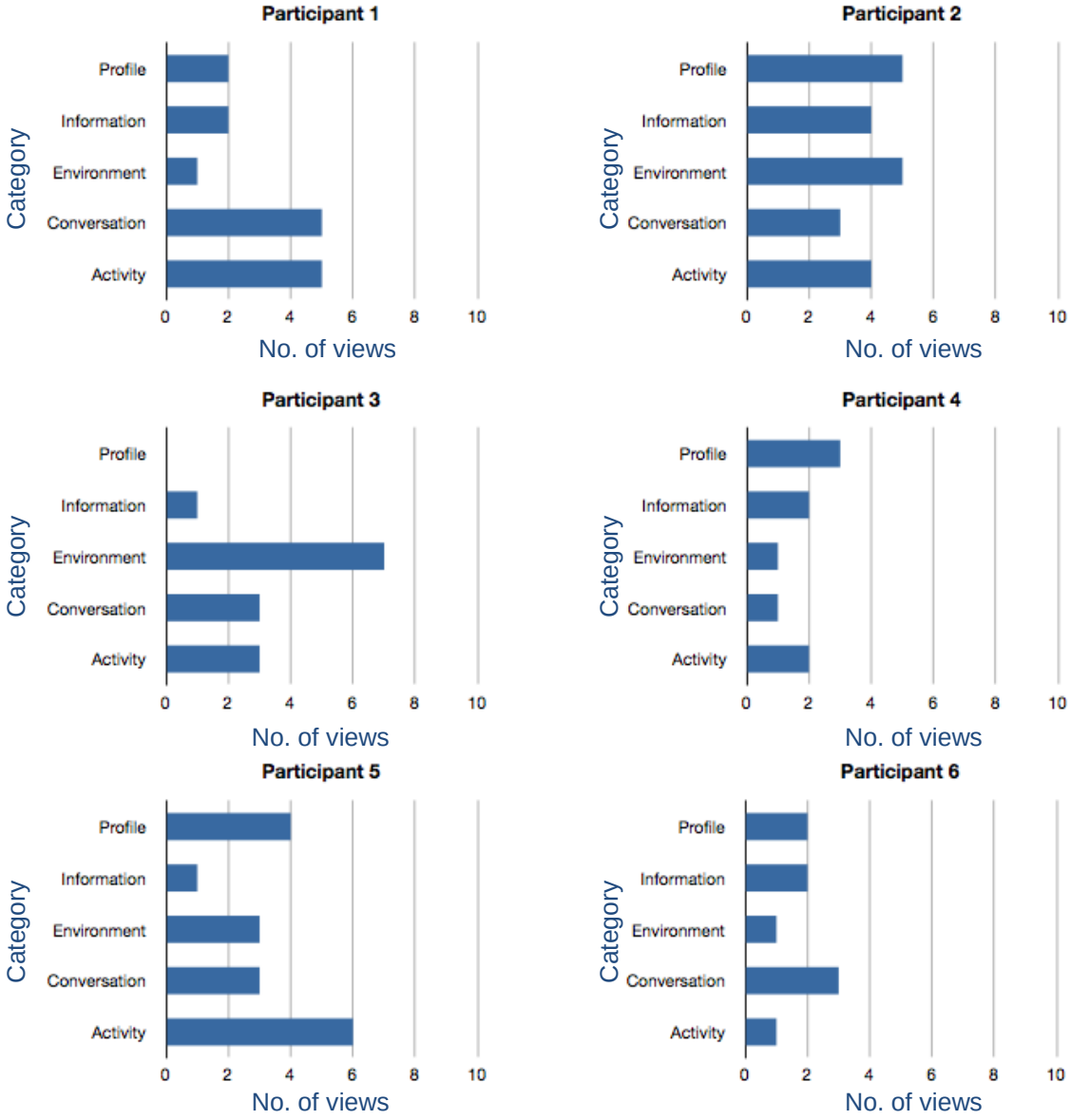


Figure 7.16 - Variations in participant's use of the MHIRROR resource

7.5.3 Evaluation questionnaire

As a means to assess whether the type of human information sought by designers was incorporated in the resource, the designers were asked to list (at least) 10 things they would like to know about a group of users if designing a mainstream domestic product, prior to receiving any information about the resource or the brief. Upon completing the brainstorming task the first question posed to them was whether the resource had delivered on the information they listed.

The evaluation questionnaire then looked to assess whether the resource could deliver on the criteria identified through earlier studies (i.e. Chapters 4 and 5). These being firstly the designer's assessment of the resource's ability to deliver human information in terms of information and empathy, broadly questioning if the MHIRROR resource had been useful for the intake of firstly, information, and secondly, empathy. This was further examined through a likert-scale question asking the participants to rate the usefulness of the model of representation, retrieval, organisation, and reflection (RROR) for effective delivery of information and empathy. Finally the five content sections (profile, information, conversation, environment and activity) within the resource were rated (likert-scale) in terms of their information and empathy characteristics.

The post evaluation questionnaire consisted of nine 'yes/no' questions, which also requested a written explanation to accompany the answers given, and three likert-scale questions. The table below shows all the questions asked (illustrative images of MHIRROR screenshots used in the original have been removed for consistency).

Post Evaluation Questions
Q 1. Did the MHIRROR resource help answer the questions you wrote down pre-task?
Q 2. Did the MHIRROR resource answer any questions you had not thought of pre-task?
Q 3. Was the MHIRROR resource useful for intake of -
a. Information?

b. Empathy?

Q 4. Did the MHIRROR resource provide useful people-based -

a. Insight?

b. Inspiration?

Q 5. If MHIRROR were made available to you, would you use it?

Q 6. What changes or improvements would you suggest for this resource to make it more useful to you?

Q 7. Please rate the usefulness of the resource (i.e. 1- 9, 1 being very low, 9 being very high) in terms of -

a. Representation of information and empathy

b. Retrieval of information and empathy

c. Organisation of information and empathy

d. Reflection of information and empathy

Q 8. Please describe your impression of the following categories in the MHIRROR resource and their value -

a. Profile

b. Information

c. Conversation

d. Environment

e. Activity

Q9. Please rate each section of the resource (i.e. 1- 9, 1 being very low, 9 being very high) for

a. Profile - i. Information; ii. Empathy

b. Information - i. information; ii. Empathy

c. Conversation - i. Information; ii. Empathy

d. Environment - i. Information; ii. Empathy

e. Activity - i. Information; ii. Empathy

Q10. When design development begins typically a designer has to depend upon their prior knowledge and intuition, until arrangements can be made to interact with the intended end users. Do you believe a resource such as MHIRROR can help bridge this gap?

Q11. Please indicate where you think such a resource falls in terms of potential to help designers bridge the gap between their existing knowledge and meeting actual users (i.e. 1- 9, 1 being ‘existing knowledge’, 9 being ‘meeting the users’).

Q12. Is there anything you would like to add on the subject of information and empathy for people-centred design, and the potential for resources to assist this process?

7.6 Results from using Kirkpatrick evaluation model

The following section will report the results of the questionnaire under the Kirkpatrick evaluation model categories.

7.6.1 Kirkpatrick evaluation model

In addition to asking participants directly to respond and rate in regard to tool deliverables (e.g. delivery of information and empathy; effective retrieval, representation, organization and reflection) the Kirkpatrick Model (Phillips, 1990), was also used for evaluating the responses to the resource in terms of 'reaction', 'learning', 'behaviour', 'results' and 'validation'.

This is a well-established model for evaluating new tools in both academia and industry (Phillips, 1990; Ahmed, 2000), providing a conceptual framework for evaluation criteria and data collection as can be seen in table 7.2.

Table 7.2 – Questions in relation to the Kirkpatrick Model for evaluation

Evaluation mode	Definition	Questions addressing topic
1. Reaction	What participants think of the proposition	Q3, Q4, Q6, Q7
2. Learning	What participants learn from the proposition	Q1, Q11
3. Behaviour	The impact of the proposition	Q2
4. Results	Fitness for purpose of the proposition	Q8, Q9, Q10, and success in generating concepts.
5. Desirability	Was the proposition perceived as appropriate	Q5, and 'Microsoft Desirability Card' exercise.

The criteria typical of the Kirkpatrick Framework were used; however validation was substituted with a new criterion of 'desirability', as desirability was considered a strong indicator of the potential success of the resource. The logic of using desirability as a criterion being that in order for a resource to be

adopted into the design process, benefits of the resource must outweigh the barriers, hence it was felt that if the resource were considered desirable then the indication was that it is perceived as both efficient and effective enough to be adopted. The criteria of desirability is difficult to gauge; therefore, in addition to asking outright whether designers would "use MHIRROR if it were made available to them" the 'Microsoft Desirability Card' method was also used to further elaborate on this element. The Desirability Card method was adopted as a quick means of exploring the theme of desirability as it requires the selection of specific descriptors, which the researcher could further enquire about for qualitative insight.

7.6.2 Reaction (Q3, Q4, Q6 and Q7)

In terms of reaction, the response to the MHIRROR resource was on the whole very positive. This criterion explored what the participant's opinions towards the MHIRROR proposition was, and was approached through Q3, Q4, Q6 and Q7. Q3 and Q4 investigated the reaction to and intake of the resource materials, specifically Q3 enquired as to how useful the MHIRROR resource was for the intake of information and empathy, and Q4 asked if the MHIRROR resource provide useful people-based insight and inspiration. Whereas Q6 and Q7 investigated the usefulness and potential improvements, specifically Q6 asked what changes or improvements were suggested for the resource, and Q7 requested scores for the usefulness of the resource in terms of representation, retrieval, organisation and reflection.

Responding to Q3, which asked if the resource was useful for the intake of information, 100% of participants agreed that it was useful.

"It was rich, lots of stimulation in not much time" Participant 1
"Concisely contains information. Quick to understand working structure." Participant 2

As to whether the resource was useful for provoking empathy, the response was varied with 50% of participants agreeing, 17% undecided, and 33%

disagreeing. However, some stated they did not try to empathise, but instead wanted to understand on a purely physical level.

"To be honest empathy was not high on my list during the exercise. The physical action videos were the most useful." Participant 5

Responding to question four, part a, 100% of participants believed the resource provided useful people-based insights.

"There were a lot different resources about each person, which gave a variety of insights, particularly the video." Participant 1

"Again the video resource here is probably the most useful to get a feeling for what people are actually doing/needing." Participant 2

Responding to question four, part b, 100% of participants believed the resource provided useful people-based inspiration.

"Conversation and activity sections can trigger ideas by watching people go about activities." Participant 2

"Made me think of things which I couldn't gave thought of if (I was) on my own with a blank bit of paper." Participant 6

Participants were asked to rate the usefulness of the key elements of the resource (i.e. representation, retrieval, organisation, and reflection) within the resource (1 being very low, 9 being very high). All were rated highly, as represented in Figure 7.17) which shows the average score for each, followed by a breakdown of the average score each theme received and representative comments by the participants to illustrate.

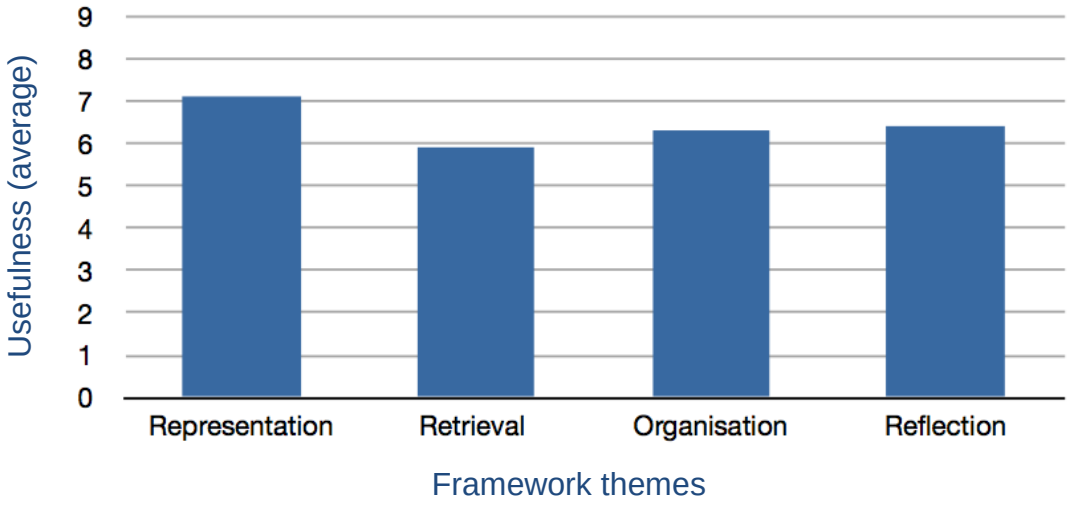


Figure 7.17 - Usefulness ratings of MHIRROR tool themes

'Representation' was rated most strongly with an average score of 7.1 for the MHIRROR tool with accompanying comments such as –

"Videos and pictures are the most useful thing about this site." Participant 3
"I thought the tool allowed the users to represent themselves" Participant 6

'Retrieval', although relatively strongly rated with an average score of 5.9 was the weakest of all the categories, this was largely due to issues on the day with the video speed. Accompanying comments stated –

"I liked the way it was arranged by person, but a tag structure would be useful so you can investigate particular themes." Participant 1
"Well structured but had some tech problems on video section. On UI side perhaps navigation could be improved by having profile thumbnails always present. Could also have menu on top so don't need to scroll down in conversation section to move to another section." Participant 2

'Organisation' was also strongly rated with an average score of 6.3; however, in response to this element the comments indicated that improvements would be desirable in a final version of the resource.

"It's well-structured. Always possible to do better." Participant 4
"Everything was there, the content was on the site and powerful, but I didn't notice a hierarchy." Participant 6

Finally 'reflection' was again rated strongly with an average score of 6.4, the timed element of the task was mentioned by participants as something that limited their scope for reflection; however, they felt the resource was well-placed to assist them with reflection.

"Good here because the tool is non-biased and allows the designer to focus and inform the design process." Participant 2
"Made me think about people I wouldn't have thought of otherwise, such as the visually impaired." Participant 3

7.6.3 Learning (Q1, Q11)

Two evaluation questions were relevant in terms of the learning criteria. Firstly Q1, which asked if the resource helped answer questions recorded in the pre-task. Secondly Q11, which asked for a scoring of potential to help designers bridge the gap between their existing knowledge and meeting actual users.

100% of participants believed the MHIRROR resource had helped to answer the questions they posed pre-session, the participants commented –

"Preferences question was the first thing I looked for, also the general profile helps in establishing the baseline." Participant 2
"Answered pretty much all of them and more." Participant 5

In addition to this 100% of the participants believed the resource could go someway towards bridging the gap between a designer's existing knowledge and actually meeting the users, giving it an average rating of 5.9, where one represented existing knowledge and nine represented meeting the user(s) being considered (Figure 7.18).

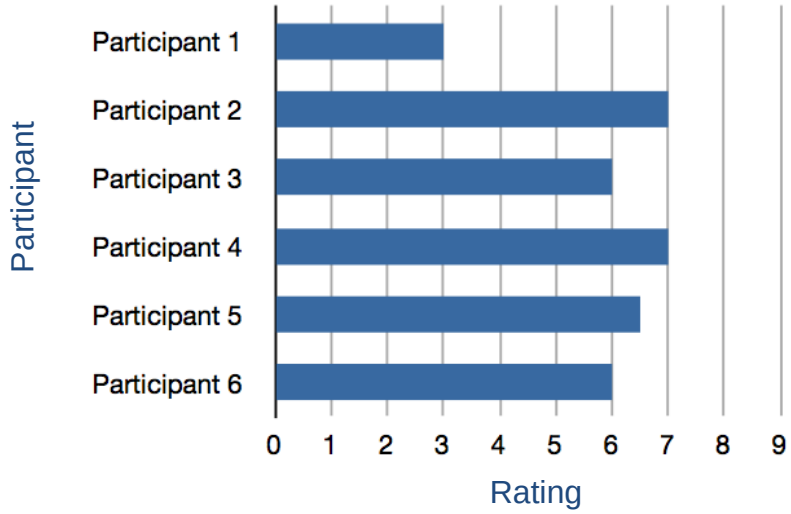


Figure 7.18 - Value of resource in bridging knowledge gap between designer and user

7.6.4 Behaviour (Q2)

In terms of 'behaviour', Q2 queried this subject revealing all but one (83%) of the participant's believed the MHIRROR resource went beyond providing what they had identified as important information about the users' pre-task, and indeed provided useful information beyond what they would have asked for. Comments qualifying this judgment included -

"I was thinking mainly of the user, but had the environment in the background." Participant 2
"Hadn't thought to ask about physical ability. Shame on me." Participant 5
"Well it compiled a lot of the important questions from ergonomics to opinions in one place it was the culmination of them that was very useful." Participant 6

7.6.5 Results (Q8, Q9, Q10)

In terms of 'results', the overall evaluation was that the resource was fit for its intended purpose. This was validated through Q8, Q9 and Q10, which explored this theme, asking for impressions of section categories, ratings of each category delivery of information and empathy, and finally directly asking if participants felt the resource could help bridge the gap between existing prior knowledge and intuition and actually interacting with the intended end users.

Q8 asked for impressions of the resource categories (i.e. profile, information, environment, conversation and activity), each of which was met predominantly with positive comment, with the exception of the 'information' section. The following comments were made in regard to each section –

a. Profile
"Very nice, well presented, appropriate amount of information." Participant 1
"Good, but want to know more about context (e.g. who do they live with, any pets etc.)" Participant 3
b. Information
"A bit useless for this activity as I was in discovery mode. Could be helpful once brief is more defined" Participant 2
"Probably more useful once design moves onto a physical object." Participant 5
c. Conversation
"Very good resource together with environment, and activity, this is the best." Participant 2
"Very useful snippets of relevant information." Participant 3
d. Environment
"Kind of useful as an overview but if I want more detail then I need to see many more pictures (e.g. open kitchen, cupboards, closets etc.)" Participant 3
"Really useful to give context of use" Participant 5
e. Activity
"Great for this brief, could expand by having other activities, e.g. going shopping, taking public transport, bathing." Participant 2
"Also really good. You see how they move and interact, sort of pulls everything together." Participant 6

Q9 asked participants to rate each section of the resource in terms of the delivery of information and empathy. Figure 7.19 shows the results.

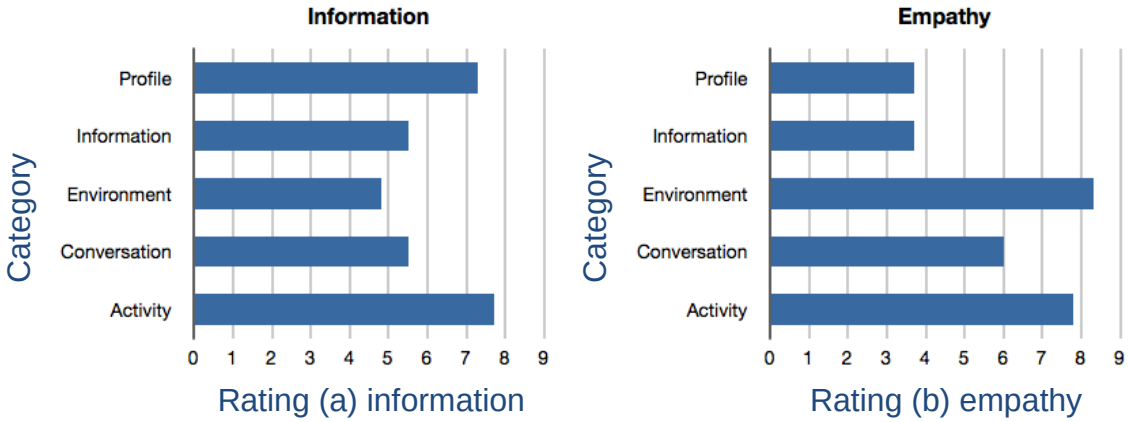


Figure 7.19 - Categories delivery of information and empathy

The 'activity' section performed best, being perceived as providing a high level of both information and empathy. Information performed least well, being considered low in empathy provision and moderate in information provision. The graphs show participants believed that information and empathy was delivered through the resource. As intended the various categories provided different levels of information and empathy, but in combination could be seen to provide high levels of both. This was demonstrated by some participant comments from Q8, that mentioned using combinations to best inform their decisions –

When talking about the 'conversation' section	"[It is a] very good resource together with environment and activity, this is the best." Participant 2
When talking about the 'activity' section	"[I used it] with 'profile', it's what I used the most" Participant 4

Finally, responses to Q10, asked participant whether they believed MHIRROR could help bridge the gap between intuition and interaction with actual end users. 100% of participants agreed that the resource could accomplish this function, with supporting comments including -

"Definitely. There is one danger though some designers (including me) could substitute this with actually seeing people." Participant 2
"Yes very much. It's also a good training tool for designers and researchers to pull (out) insights and design ideas." Participant 6

7.6.6 Desirability (Q5 and 'Microsoft Desirability Card' exercise)

The criteria of 'desirability', was added to the evaluation as it was considered critical that designers judge the resource as desirable if it were to have any chance of uptake within their processes. This was first examined through Q5 and further explored through the use of the 'Microsoft Desirability Card' technique. Q5 asked if the MHIRROR resource were made available to them whether they would choose to use it, to which 100% of the participants answered yes; however, there were conditions stated by some participants such as -

"I would use it definitely; however, the profiles of people would have to expand and be updated every so often so it's not always the same info." Participant 2
"(It would) depend on brief and time. If I weren't able to do visits like this myself I would definitely use it." Participant 5

The 'Microsoft Desirability Card' technique provided further insights into the participant's opinions regarding the desirability of the MHIRROR resource. As there was a need to explore elements that went beyond simply testing whether the tool could be used, toward understanding how valuable the designers believed the MHIRROR tool could be. In order to explore some of the less tangible evaluative results, such as desirability and usability, the Desirability Card method was used (Benedek and Miner, 2002). Some of the terms Benedek and Miner use to classify desirability are - 'worth having' 'useful' and

'advantageous', all of which are essential criteria for the potential uptake of the MHIRROR resource by designers.

This approach used 'product reaction cards', which are a selection of 118 cards (see Appendix I) that have a variety of descriptive words and terms broadly relating to usability. The cards are in a ratio of 60% positively, and 40% negatively descriptors. The test was administered rapidly (i.e. two minute limit for card selection, 5 minute limit for choice explanation), with participants selecting cards that they felt describe their opinions to the resource used, they later explained their choices using the descriptors as a start point. This desirability study was considered appropriate as it was fast and highly descriptive, which would help to gather the designers' opinions of the resource, which could be further explored for further insights.

The results of this process are shown (Table 7.3) with the top positive and negative terms compiled with an accompanying comment example for each. The comments were predominantly positive, hence the top eight, which at least five of the six participants selected, were taken as the most representative reactions to the resource. The top three negative terms were also compiled as points for consideration; however, these were considerably less evident in the participant's selections, with only three negative terms being selected by more than one participant.

Table 7.3 - Positive MHIRROR characteristics highlighted in desirability test

Most Popular word choices	Participant comments explaining choices
Accessible (Selected by six participants)	"The site is a very accessible tool, and I think it's really understandable once you go to the homepage you just click on things and you start to learn about people." Participant 6
Easy to use (Selected by five participants)	"Easy to use because I think it is very dumbed-down, I mean you only click and the information is right there." Participant 2
Effective (Selected by five participants)	"Effective because the questions that I might ask myself pre meeting someone, are there." Participant 2
Helpful (Selected by five participants)	"Helpful, as it helped me think about the brief." Participant 4
Intuitive (Selected by five participants)	"Intuitive to use, I got it right away." Participant 4
Organised (Selected by five participants)	"Organised, it's well organised, particularly in regards to the brief, so as soon as I latched onto the information, I wasn't going to get as much from it for this particular brief, but I knew I could immediately jump to the activity, immediately jump to the environment, and see that, so it was easily interpreted, so therefore well organised." Participant 5
Usable (Selected by five participants)	"Yeah I can navigate round it and take what I want from it, ditto would be usable, and useful and valuable." Participant 5
Valuable (Selected by six participants)	"Valuable, because it's time-saving, and it's quite difficult to actually meet people, it takes a lot of time to arrange meetings and stuff like that." Participant 2

Table 7.4 – Negative MHIRROR characteristics highlighted in desirability test

Most Popular word choices	Participant's comments explaining choices
Rigid (Selected by two participants)	"Rigid, again because it was this very rigid hierarchy, rather than an indexed tagged (hierarchy), I think those ways of using information are generally more useful." Participant 1
Slow (Selected by two participants)	"Slow, because it took ages to load video." Participant 4
Unrefined (Selected by two participants)	"Unrefined since it's a little bit of a beta, and I thought some of the UI could be improved perhaps, having better navigation tools like menus always present and having little thumbnails and pictures etc. Also in the conversation section you have to move all the way down to move to another section, so perhaps that could be to the left or the right - always present." Participant 2

7.7 Discussion

Designers approaches towards understanding the natural setting of the people being designed for and the various factors within this setting often requires flexibility and using methods and approaches adapted to the issues in focus (Ackroyd and Hughes, 1981). It also requires that designers interpret the reality of the users being examined based on the information collected, creating a picture of the influences of importance to these people and the design issue being tackled (Alvesson and Sköldberg, 2000).

The MHIRROR resource intended to convey human information (elements of information and empathy) in as unedited a format as possible, attempting to communicate people-based insights, information and inspiration through the mechanisms of representation, retrieval, organization and reflection. Much of what the resource provided could be considered ethnographic in approach (Brewer, 2000), in that the resource attempted to convey understanding of people and activities within their natural setting, through recording this setting in a variety of ways (verbal, textual and visual) from within it, and making the individual responsible for the recording (i.e. the researcher) as neutral and invisible as possible, which allowed the designers to draw their own insights, or as one designer commented –

"… allowed the users to represent themselves" Participant 6

Equally the researcher took an ethnographic approach to examining the designers' use of the resource, trying to maintain as natural an environment as possible and suggesting familiar activities (i.e. brainstorming within the studio).

The resource was confirmed as useful for the brainstorming session, and for instilling people-based information and empathy. Video segments were evidently the most engaging aspect of the resource, being the most used and praised element (both the 'activity' and 'conversation' section). However, it was also noted that it was frequently used in conjunction with other elements of the

resource, this depending upon the preferences of the designer. This touches upon an element that was identified earlier in the research (Chapter 5 – probes and interviews), the fact that designers have a variety of approaches and crave flexibility and non-prescriptive resources. MHIRROR lent itself well to this requirement, as can be seen from the evaluation results of the previous section, particularly Figure 7.16, which shows the variety of navigation approaches used by the participants. Unfortunately the videos on the conversation section were at times slow to load, this was an issue relating to the laptop, and could be rectified by 'refreshing'; however this proved frustrating for some participants (particularly participant 4) in their evaluation responses.

Question six asked for suggested changes/improvements, the feedback from which is useful for consideration in any further developments. Most suggestions for improvement tended to centre around design improvements, and increased content -

"More participants more activities filmed meta-tagged and filtered so easy to find relevant stuff. Possibly video chopped up into tasks like the questions but still with the option of watching a whole sequence. Better quality photos of the home maybe 360 degrees like Google street view. Better lighting in video." Participant 1
"Better interface. More context for person (e.g. do they live alone etc.) More relevant users for me (e.g. surgeons clinicians etc.) More contextual interview (e.g. going shopping)" Participant 3

There are also ethical considerations that would have to be thoroughly investigated in regards to disclosing private life settings and insights, particularly if the resource was to be released in the public domain. This also links with the potential for the resource to be expanded towards a collaborative/co-design business model, where some form of reciprocity could be managed for those contained within the resource in providing their information initially and engaging in further consultation.

7.8 Summary

There are many challenges when offering a new resource to designers; on a professional level, designers like to be in control of their decision process and utilise their skills, so are wary of information they have not personally gathered, hence trust is a key issue. On a practical level, there are logistical, financial and perhaps most significantly time restrictions that exist in projects that make the introduction and use of new tools difficult. These were challenges inherent in a tool proposal, it was key that designers felt that the information was trustworthy and impartial and that they could utilise it rapidly. These challenges were met with the resource being utilized by all the designers with no difficulty and considered useful by all. The structure was considered intuitive but flexible enough that it could adapt to individual concept generation approaches.

The overall evaluation was that the resource was fit for its intended purpose. 100% of participants believed the resource was useful for the intake of information, and also that it provided useful people-based insights and inspiration. Each participant made good use of the MHIRROR resource, adopting a pattern of use that seemed to suit their unique approaches. This was further confirmed when participants were asked to list things they would like to know about a group of users if designing a mainstream domestic product prior to the session, and 100% verified that their pre-session predicted needs had been met. Further to this 100% of the participants believed the resource could go someway towards bridging the gap between a designer's existing knowledge and actually meeting the users.

Key mechanisms proposed by the resource (i.e. representation, retrieval, organisation, and reflection) were all rated highly in terms of usefulness. 'Representation' was rated highest at 7.1 out of a possible 9; followed by 'reflection' at 6.4; 'organisation' at 6.3; finally 'retrieval' was rated poorest but still scoring a respectable 5.9 (this lower score being largely blamed on technical issues on the day of testing relating to video speed).

The designers spent most of their time watching the two-minute ‘activity’ clips that presented footage of an everyday tasks; one participant’s comment was particularly revealing highlighting an awareness of time constraints through stating it gave the “most insight per time spent”. ‘Conversation’ video clips were the most used, with each designer’s watching a minimum of five of these clips each. Other sections were frequently referred to alongside these sections, adding more detail to supporting insights and inspiration, frequently ‘profile’ or ‘information’ took this role. As intended the various categories were conformed as providing different levels of information and empathy, but in combination could be seen to provide high levels of both. In relation to empathy as a whole 50% of participants thought the resource was useful for the intake of this component for the evaluation task, 17% were undecided, and 33% disagreed (however, these participants stated empathy had not been an element they sought out for the evaluation task, they instead sought information). However, a later question asked the participants to rate how effectively overall the categories delivered on information and empathy, this resulted in ‘profile’ and ‘activity’ rated highest in terms of information, and ‘environment’ and ‘activity’ rated highest in terms of empathy.

The issue of information need at differing stages of the process was highlighted with ‘information’ being the least used category, most participants perceiving it as too detailed for their needs at the concept generation stage.

Finally the desirability test demonstrated a consensus that the tool was perceived to have many desirable qualities; the main characteristics being identified as accessible; easy to use; effective; helpful; intuitive; organised; usable and valuable.

Chapter 8. Discussion, conclusions and further work: Supporting people-centred design through information and empathy

This chapter will conclude the thesis by discussing the studies undertaken, their contribution to knowledge and the conclusion that the combination of information and empathy is valuable to people-centred design, and it has the potential to be supported through mixed media human information resources. Suggestions for potential future work will also be outlined.

8.1 Overview

The central theme behind this research was based around an exploration of the role that information and empathy might have for designers, particularly through proposed resources generated to provoke and promote people-centred design.

The aim was to contribute towards understanding the ways in which the use of people-centred information and empathy can be enhanced in the design process. Focusing upon how human information is organised and communicated to and by designers to impact their design processes and how resources might support this.

The under-explored nature of this area required empirical research engaging in practical ways with designers throughout the development, in order to ensure that the findings and outputs would have practical relevance for design practice. Initially insights were generated from a literature analysis (detailed in Chapter 2) to establish the current thinking, position and potential of information and empathy. The research then proceeded to go through a combination of descriptive and prescriptive studies and an evaluation. These took the following form.

In-depth probe studies and follow-up interviews (detailed in Chapter 4) with 10 designers to examine professional practice towards understanding designers'

processes; identifying the key themes for human information manipulation (i.e. representation, retrieval, organisation and reflection).

Active participation in two four-month real-life design case studies (detailed in Chapter 5) taking a lead research role in collaborations with design companies. Further examining designers' behaviour and the potential of human information delivery to impact design thinking both before and during commercial design development process, from which three critical elements of importance were highlighted (i.e. information, inspiration and insight).

Rating and co-design of eight resource concepts during two workshops (detailed in Chapter 6), each workshop involving more than 20 designer participants examining and co-designing resource formats and contents. To establish criteria for capture and communication of human information that could be developed into a resource.

The studies culminated in the creation of a working online resource proposal that embodied findings from the previous studies. An evaluation (detailed in Chapter 7) of this mixed media human information resource - 'MHIRROR' (Means of Human Information Representation, Retrieval, Organisation and Reflection) was completed with six experienced user-centred design practitioners; assessing the potential value and desirability of the generated human information resource, in addition to producing further insights and areas for future development.

8.2 Meeting the research objectives

This research set out to investigate the role of information and empathy in people-centred design. It intended to provide an understanding of the nature of these elements and what designers would require from resources in order that these elements might be supported and integrated into their design process. Through examining and interviewing designers within their studio environments; introducing human information communication approaches in real life projects; and co-designing concept tools with designers, an understanding of the human information needs of designers was established from which a framework was developed and used to build a final prototype resource for evaluation. The proposed resource named MHIRROR was developed based on the findings from this research, aiming to remove self-referential design thinking by engaging designers with a prototype that conveyed a variety of human information from different people's perspectives and was sympathetic to designers' existing processes. This process fulfilled the objectives of this research (Table 8.1).

Table 8.1 - Objectives of the thesis

Objectives	Approach	Chapter	Major finding
Objective 1: To uncover current habits and opinions, and understand what human information is currently used and useful to designers.	Probes and interviews	2 & 4	R.R.O.R. framework
Objective 2: To investigate criteria of human information to allow designers to integrate human information into product development prior to development (5a) and at the early stage of development (5b).	Case studies	5	The 3 i's (i.e. information, inspiration and insight)
Objective 3: To develop a resource proposition, from initial concept tools and co-design workshops with designers, through to the development of functioning online resource.	Tool generation and assessment/co-design workshops	6	Designers' human information format and feature preferences
Objective 4: To present and evaluate the final online resource proposal that embodies findings from the previous chapters.	Evaluation with designers	7	Confirmation of as novel, useful and desirable to designers

8.2.1 Probe kits and interviews:

Objective 1 - Current role of human information in design practice

Probe kits were deployed to explore current resources and thinking processes exploring how designers go about understanding those they design for, capturing their environments and processes. The feedback was compiled and used to form the basis of later in-depth interviews carried out with the same designers. The findings from the interviews were then coded and categorised, which led to the identification of themes (i.e. representation, retrieval, organisation and reflection) in their human information processes.

8.2.2 Case studies

Objective 2 - Criteria of human information in live projects

To explore and confirm the value of the identified themes and trial means for transfer of information and empathy findings to designers, the author took the role of a 'lead researcher' in two four-month real-life projects with commercial partners. These projects represented complex social and health-related issues respectively, and required in-depth understanding of multiple stakeholder perspectives, environments and the connections between these.

In these roles the researcher was tasked with the collection and communication of relevant people based research findings. Informed by the previous studies material combinations intending to communicate information and empathy were developed into mixed media resources. These conveyed key issues to provide the designers with their data requirements through the production of engaging human information resources that were highly visual, descriptive and immersive.

The results revealed that in order to effectively meet users' needs, designers desire, a balance of both useful information and immersive empathic understanding was required. It was concluded that this desire could be met

through resources that would convey information, provide insight and provoke inspiration.

8.2.3 Development of tool

Objective 3 - Development of resource propositions

The intention of this study was to develop upon the work of the previous studies to investigate and develop a generalisable framework as a means of gathering human information and communicating it in ways that would be easily accessible to designers, to inform their people-based definitions and solutions to design problems. Towards this goal proposals for resources to support the use of information and empathy were developed and tested through a series of workshops, where professional and student designers rated proposed resource concepts and co-designed new concepts.

The workshops identified that the way data is presented should make understanding implicit, and naturally build on the knowledge a designer already possesses, speaking the designer's data language, and allow them to add to the story of their design development in a natural way.

This aided further refinement of the framework for a human information resource proposal, constructed to align with the previously identified themes, the emerging proposal being MHIRROR (Means of Human Information Representation, Retrieval, Organisation and Reflection.)

8.2.4 Evaluation of MHIRROR proposal

Objective 4 - Presentation and evaluation of resource proposal

The MHIRROR proposal went on to be realised as a working online prototype, presenting a framework for an updatable mixed media user databank. As the goal of the resource was to motivate designers to think beyond their personal experiences, data was collected and input to represent six diverse people, in terms of information and empathy. Content was preloaded and the resource

was presented ‘ready-to-use’, which allowed designers to fully engage with the prototype immediately.

To validate the resource an evaluation was carried out by six designers from the Helen Hamlyn Centre for Design, a leading European centre for inclusive design and research. They were given a series of concept generation tasks based around the design of home-based objects, and evaluation tasks to be completed with the use of the resource.

The overall conclusion was that the resource had potential to meaningfully impact the design process by offering human information that provided a genuine feeling of connection to those being designed for; imparting insights and information to inspire their concept generation.

8.3 Conclusions

A variety of conclusions have been made through the research, which address the original research question and sub-questions –

What is the current and potential role of human information in the design process, and how might this role be supported and enhanced?

Where tacit knowledge is insufficient designers prefer to generate their own material through experiment, beyond this they will source human information in the same way they source other project related data, in a largely ad-hoc way. Where experimental user-based information collection is not possible (e.g. due to time, money or skill constraints) their collection is predominantly Internet based, as there is no regular source or specialised software that is commonly adopted.

The role that human information can play in design can span the full design process, and has particular value in the early stages. This has been demonstrated through the research, which engaged with live design developments and with designers throughout the stages, including problem understanding, brief development, concept generation, concept development and concept interrogation and design development.

Combining information and empathy in a variety of formats provides greater possibilities for designers to build up a richer understanding of those they design for, which they can apply in ways that are natural to their learning approaches and design thinking, in addition to allowing room for their own individual interpretation and curation. Rich representation of diverse user types through focused human information resources could assist in demystifying and allowing access to the value that end users represent to the design process, and motivate designers to further engage with the concept of people-centred design. The Representation, Retrieval, Organisation and Reflection (RROR) framework which combines critical elements for the development of design

focused human information resources could be used as the basis from which to develop relevant human information tools for use by designers.

a. What role does people-based data currently have in design development?

The format and content of user-based information currently available to designers has limited value. Much of the data is not produced with designers in mind, but instead other professions interested in human representation (e.g. medical professionals; ergonomists etc.) that have markedly different needs, hence these materials have limited applicability for the product development process. Equally there is little in the way of available information that presents the content being examined in this study (i.e. human information).

b. What are the requirements of a resource to facilitate inclusion of human information in the design process?

Designers often focus on elements of design such as materials and manufacture, which are consistent and accessible. If designers could gain similar levels of access to useful human information and have resources in place to manage it through representation, retrieval, organisation and reflection then the inclusion of these elements would become more prevalent. Providing designers with human information and resources to manage and utilise such information could engage them with the framework and knowledge required to make best use and reuse of user-based research materials, and remove dependency upon externally provided materials, tacit knowledge or guesswork.

Collections of user-based data can be valuable if trusted and presented in a language that aligns with or supports preferred formats and is design-relevant.

8.4 Limitations of the research

The approach to people-centred design could never take one prescribed path. It is influenced by a huge number of factors unique to each project and designer/design team, hence a support resource cannot be fully prescribed. The most one could hope to do is attempt to understand at some level what is useful in design practice and offer resource propositions that are flexible enough that they might be adapted to fit within the designers' already established processes.

Specific to the studies undertaken within the thesis the following limitations have been identified.

Study 1: Probe and interview

Study 1 sought to uncover current habits and opinions, and understand what human information is currently used and useful to designers through probe studies and interviews. Designers that contributed to this study were largely from smaller consultancies, and had particular expertise and experiences unique to their practice; which in turn influenced their process, the materials they consulted and their attitudes towards human information. The sample size was limited; however, within the constraints of the study was considered both indicative and appropriate.

Study 2: Live case studies

Study 2 sought to investigate human information criteria for integration into real-life product design development projects (i.e. two live design development projects). The researcher although examining information behaviour and suggesting information and empathy resources within each case study, also had to deliver project specific data and was hence limited to the subject matter and time constraints of each project. This could be considered a limitation but equally a realistic constraint that would apply in design development, and could therefore be considered a limitation with inherent benefits in regard to fit with real-life practice.

The information delivery occurred prior to development and at the early stages of development, which although does not represent the full design development process, represents the phases that were identified as having most interest to the research.

Study 3: Co-design and evaluation of tool concepts

Study 3 sought to take human information tool concepts and present them at workshops with designers for assessment and co-design development. The tool concepts were developed based upon the literature review and previous studies. Though developed by the researcher who might be limited by his understanding, the tools were designed to be deliberately broad and under-defined in order that the designers could make their own interpretations and place their own meaning upon them. Hence the main findings from this study were based around broad format and feature preferences that were then interpreted into an overall tool prototype. Some of the concepts presented were outwith the resources available for the researcher to realistically realise as a prototype (such as Ergolab – a laboratory equipped with experts, users and physical resources); however, these were useful to indicate preferences such as face-to-face interaction etc.

Study 4: Development and evaluation of MHIRROR

Study 4 sought to realise a working prototype (i.e. MHIRROR) based on the findings from the studies, and evaluate it with practicing people-centred designers. The prototype MHIRROR was indicative of early phase development and embodiment. Although this was made explicit to the designers involved in the evaluation, and instruction given that design characteristics relating to this early realisation were not to be considered part of the evaluation, the designers nevertheless made design improvement suggestions, indicating that overall execution is a strong influencing factor on overall impression/evaluation. MHIRROR being a 'beta' version and presented as such, indicated to the designers that it would have limitations; this was considered acceptable for this purpose of this research, as it would be sufficient to test the hypothesis and

give a realistic representation of the proposed human information resource features to designers. Having served its purpose for this research the resource would now need to be further developed to a professional standard and retested towards the development of a commercial resource for the design industry.

Designers are wary of research or content they consider to be old, or cannot trust/identify the source. Hence the resource will need to provide designers' with an element of authorship, and capabilities to upload and input their own material. This second limitation recognises that the information contained within the resource would have to be updated with new examples that the designers collect; in order to be valuable from project to project and provide original and on-going information, inspiration and insight. Therefore designers or similar within the group (i.e. consultancy etc.) would be required to update the resource adding new human information relating to those they consult. Hence adoption is dependant upon designers' engagement with the idea and their motivation to design in a people-centred way. The positive responses from the evaluation suggest this would not be a barrier.

Convincing designers to alter their approaches or take up new tools is difficult unless the benefits are apparent and evidently worthwhile. This third limitation will be an ongoing issue, and like any new tool, MHIRROR can only fully integrate into the process with continued use and hence establishing itself in the design domain. However, the impact that good human information made to the two case studies suggests a convincing argument, and as mentioned in the previous limitation the evaluation received predominantly positive responses, indicating designers already understand there is value in such a resource proposition.

Human information content has limited generalisability. If the explorations are made in a domestic environment (instead of for example, a work setting), then the applicability will be largely limited to similar environments. This fourth limitation is where the designers' authorship and input into the resource is

critical. If like the beta version there is a collection of preloaded people, these will soon lose originality and have limited application. However, if designers adopt the tool and update it on a regular basis as suggested, the people and contexts will continue to increase and the content have further reach. Hence the strength is in the continued use and expansion of the human information content. There is also the element of specialism with which this agrees. As designers often build up specialisms, the resource would reflect these particular areas (e.g. if the designer predominantly works on kitchen based designs, the material captured will reflect the many people and environments where their designs are found).

Testing throughout the studies was undertaken with relatively small sample groups. This fifth limitation of sample size was considered acceptable for several reasons. Firstly, obtaining time to engage with professional designers is difficult; secondly the designers selected were considered expert in the field, hence their opinions hold particular weight; thirdly using smaller sample groups is not uncommon and can be found in many studies (e.g. (Formosa, 2009; Goffin *et al.*, 2010)); finally is the principle of 'diminishing return' (Nielsen and Molich, 1990), where the feedback was perceptibly repeating and increasing the sizes was not considered likely to provide substantial additional insights.

8.5 Contribution to knowledge

This thesis has made original contribution to knowledge in the following aspects:

Framework: this research has identified the potential of information and empathy combinations to influence people-centred approaches in design. It has identified through the human information needs of designers through probe studies, interviews and real-life design projects, and suggested a framework (i.e. representation, retrieval, organisation, and reflection) for collecting and communicating these needs through information delivery during live projects and through prototyped resources.

Resource: the research has applied design principles in the form of an iterative development and included designers throughout the process (i.e. considering designers as the 'users' of research outcomes), drawing out their needs and embodying these empirical findings and framework themes into a unique prototype proposal for a human information resource (i.e. MHIRROR), confirmed as useful through evaluation with designers.

Theory: the work presented in this thesis has provided the groundwork for future human information resources to be developed, by highlighting the potential role of information and empathy, as well as the needs of designers in terms of support and resources. Hence this research has indirectly contributed to theory by exploring the value of information and empathy resource combinations and their potential to promote people-centred design, during real-life projects and in controlled workshop and evaluation sessions.

These qualitative explorations with practicing designers and within real-life projects and settings helped develop an understanding of the potential for human information resources to enhance the design process. The research has produced a range of outcomes for people-centred design knowledge including:

- Insights into the early stages of design development in regard to information and empathy leading to the working definition of 'human

information’; meaning the collection of people based information and empathy building materials to inform people-centred design.

- Formation of the framework - R.R.O.R. (Representation, Retrieval, Organisation and Reflection) for the manipulation and integration of human information into the design process.

- Design and embodiment of a working online mixed media human information prototype resource. This has established the proposition that rich descriptions of people’s lives can be collected, collated and considered alongside hard ‘facts’ for a more genuine understanding of individuals within the design process.

8.6 Impact

This thesis identified themes of representation, retrieval, organisation and reflection, and their potential role and value in real-life design projects. It also presented the first manifestation of a new web-based tool developed to embody the thesis findings, providing a unique resource to support human information manipulations. The prototype embodies two major contributions to the design process -

Composition: a resource for human information representation, retrieval and organisation

Contemplation: a resource for reflection upon mixed media human information

The development of this resource is an examination of the effect of human information support towards encouraging 'people-centred' consideration during the design process. As part of the research resources were compiled to communicate information and empathy to designers in the two real-life studies. These resources successfully engaged the design companies, and both projects produced successful human-centred design outputs that went into production and were widely publicised.

This work has already been disseminated internationally (see Appendix J) through eight published conference papers (all of which were presented to peers at reputable human-centred conferences); four poster presentations; two journal publications; and studies within the research being published in two books.

An element deemed crucial to the value of the research within the design community was the involvement of practicing designers throughout the research, which although time-consuming and logistically problematic was also achieved for each objective. The working prototype was developed and evaluated by design professionals, who verified its value and desirability. A growing interest has been demonstrated in the work by industry beyond those companies included in the studies, with the researcher being contacted by

several companies not connected to the study, interested in the current status of the resource and its availability.

Finally the research was submitted to and attained the Human Centred Design Research Prize at Brunel University, judged by four internal and three external judges. The themes will now be part of an on-going conversation through a regularly updated blog written by the researcher and hosted on the Human Centred Design Institute (HCDI) webpage.

8.7 Recommendations for future work

To summarise, the principles of information and empathy use and the proposed resources, which were represented through the MHIRROR prototype, were well received by designers and are therefore considered to be of potential benefit for people-centred design. The engagement with professional designers in every study within this research demonstrates the emerging interest in these issues, and the desire designers have for support resources that have been developed with their involvement and considering their needs. Further development should include designers throughout the iterations.

The positive evaluations from designers who used the prototype resource provides a level of agreement with concept, content and configuration, and is considered an indication of potential success and adoption within the design process, if full professional development of the tool were to be undertaken. The evaluation presented a 'Beta' version, which encouraged honest feedback in the form of suggested improvements that could be used in any further development of such a resource. To take MHIRROR beyond this thesis, from academia into industry, the next stage would be to develop the prototype into a fully realised resource with updatable features, through the input of professional web-designers and similar. A maintenance plan and guidelines would also have to be produced for the resource to remain useful. In the realisation of such a human information resource, success could be further measured by application and testing of the resource within a professional design development.

Essentially the findings from this research could be considered a starting point, in that the research has identified the importance of information and empathy and the positive effect this combination has on people-centred design output. It has also verified that designers are keen to engage with these principles and resources that can support them. Therefore there is huge potential for this work to be further developed in terms of technical and format development of the Internet based resource.

Recommendations for future developments include –

- Refinement of the themes and recommendations identified within this research with professional designers

- Exploring the potential of design-trained individuals to undertake a new role bridging the transition of research into design-usable input.

- Further development and full realisation of the MHIRROR resource by professional web-designers and database developers.

- Development of guidelines for content capture and the methods of updating the resource, as with the resource itself, accessible to designers.

- Follow-up usability trials with designers.

The researcher's target was to enhance the discipline through visibly undertaking research as a designer, striving to produce research of value to, and accomplished with, the input of practicing designers.

Literature demonstrated that designers do not generally engage effectively with existing tools, these being inaccessible due to issues such as the need for specific expertise out with designers typical remit, and not supporting issues such as empathy (Marshall, 2010). Hence, the more general findings from this thesis might be adoptable in guiding the development of other resources, such as presenting information in formats that are better aligned with design practice and communicate in a variety or ways and in a more visual language, as desired by designers.

8.8 Concluding remarks

Real user involvement is always recommended to the greatest extend possible, given available resources. This work identified human information (people-based information and empathy) as critical components of people-centred design, and highlighted the lack of support that currently exists for designers in this area. The potential for offering meaningful support was explored through participation in real-life developments projects and a series of studies with professional designers. The resulting framework demonstrated an approach to effective human information use embodied in a mixed media online resource prototype; evaluated and confirmed as desirable with professional designers. Hence the work is considered successful in providing a clear perspective that can be built upon or indeed challenged through future research.

The research has identified the value of information and empathy, and repeatedly highlighted the potential for new resources through engagements with designers in probe studies, interviews, workshops and real-life design development projects. It has created a unique resource proposition in the form of the means for human information retrieval, representation, organization, and reflection (i.e. MHIRROR), which demonstrated efficacy within the remit of this research. It has also raised and continues to raise awareness of the thesis themes in an on-going conversation through academic publication and presentation, a blog the researcher has been invited to author on the subject, and publicity generated through the real life projects.

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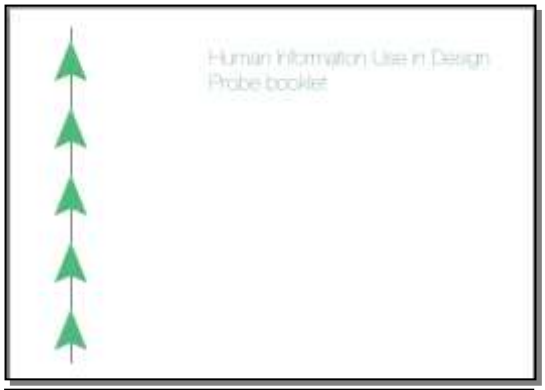
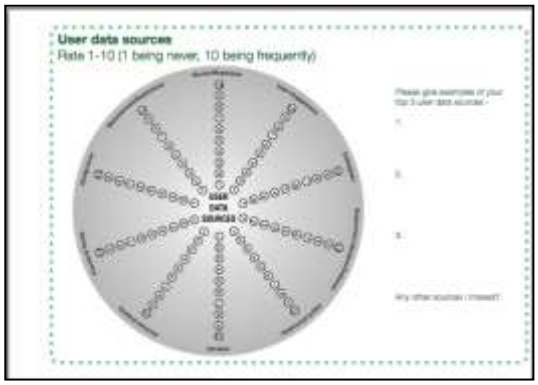
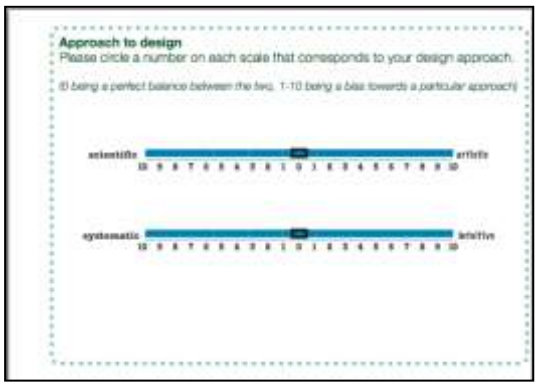
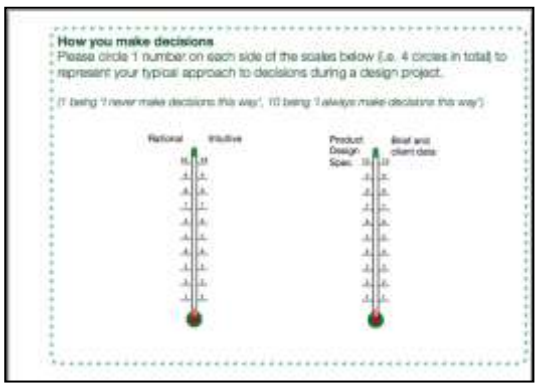
Appendices

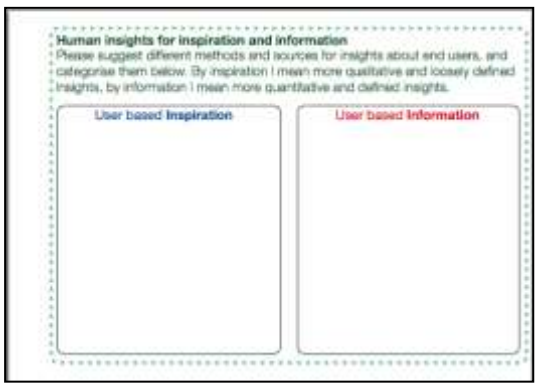
APPENDIX A (Probe booklet pages) – mentioned in Chapter 4

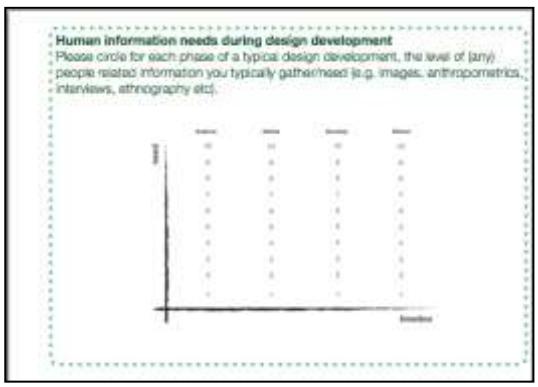


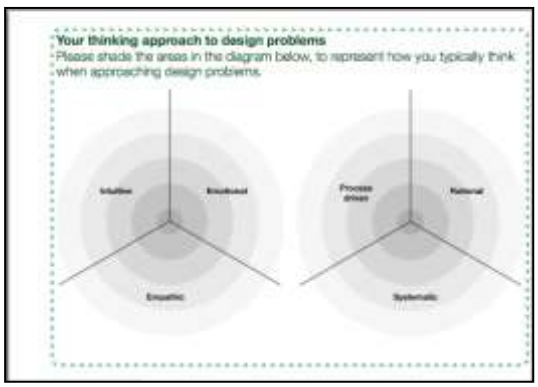



Approach to design
Please circle a number on each scale that corresponds to your design approach.
(0 being a perfect balance between the two, 1-10 being a bias towards a particular approach)
scientific
artistic
systematic
intuitive

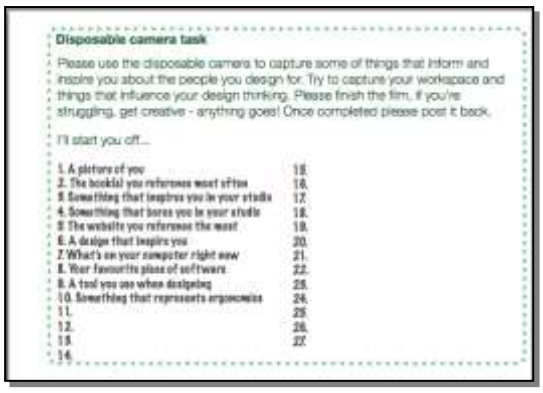

How you make decisions
Please circle 1 number on each side of the scales below (i.e. 4 circles in total) to represent your typical approach to decisions during a design project.
(1 being 'I never make decisions this way', 10 being 'I always make decisions this way')
Rational
Intuitive
Product Design Spec.
Trial and client data


Human insights for inspiration and information
Please suggest different methods and sources for insights about end users, and categorise them below. By inspiration I mean more qualitative and loosely defined insights, by information I mean more quantitative and defined insights.
User based Inspiration
User based Information


Human information needs during design development
Please circle for each phase of a typical design development, the level of (any) people related information you typically gather/need (e.g. images, anthropometrics, interviews, ethnography etc).


Your thinking approach to design problems
Please shade the areas in the diagram below, to represent how you typically think when approaching design problems.
Intuitive
Emotional
Empathic
Process driven
Rational
Systematic


2009 project reflection sketch
Roughly sketch or map the key elements of one of your design projects from 2009 and show where and user information influenced your process and thoughts.
Project name:


Disposable camera task
Please use the disposable camera to capture some of things that inform and inspire you about the people you design for. Try to capture your workspace and things that influence your design thinking. Please finish the film, if you're struggling, get creative - anything goes! Once completed please post it back.
I'll start you off...
1. A picture of you
2. The book(s) you reference most often
3. Something that inspires you in your studio
4. Something that bores you in your studio
5. The website you reference the most
6. A design that inspires you
7. What's on your computer right now
8. Your favourite piece of software
9. A tool you use when designing
10. Something that represents ergonomics
11.
12.
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APPENDIX B (Semi-structured interview outline) – mentioned in Chapter 4

(Possible introduction material to describe to participants)

Our focus is upon industrial design and innovation, particularly the earlier stages of the design process (i.e. 'develop' and 'define' phases). The intention being to investigate and clarify the current habits and methods designers use for the collection, communication and use of information relating to end users in product design development. We intend to develop tools that can assist this process, in order to develop a tool of value we are investigating what already exists what is typically used, what designer's want and what is currently missing. The intention being to develop a tool that will strike a balance between information and inspiration.

(Possible summary of aims to mention)

Establish what methods/tools/outcomes are desirable at various stages in design development.

Establish what forms of data are considered useful 'Human Data/Information' for the design process

Establish what tools and techniques are commonly adopted

Establish what kind of user data is desirable

Establish where/if anthropometrics feature in a design development process

Gather opinions on Inclusive approaches

Establish how user data is stored and transferred

Establish to what level are the following used –

Anthropometrics

Ethnography

Ergonomics

(Broad areas you will be covering)

What information do experienced designers require? How can data be effectively communicated to designers?

How can ergonomic information be visualised to engage/inspire?

What tools are typically adopted to familiarise the designer with those they design for?

How might existing data be supplemented to become an effective design tool?

How would one develop research and design tools which can give designers valuable insights into those they are designing for?

What data is already out there? What is the most popular? – Try and understand the structure and the reasons for its popularity.

What does 'data' mean to designers? Define by talking to designers – "how do you typically begin to understand data"

Is there a clear system for decision making in regard to end users, if so what is it?

(Possible questions and themes)

Human/user information – definition

What does ergonomics meant to you?

What does ethnography mean to you?

What in your opinion does useful human information for a design development include?

What people related data do you refer to in a typical project?

In a new project if you were trying to establish user needs where would you look –

- at the beginning
- during exploration
- during design development
- during testing

If you needed user input, who would you consult?

User inspiration

How would you try to understand the people you are designing for?

How do you interact with/find out about end users?

Do you have any re-occurring data sources or repeat users that you regularly

consult?

How much of your research involves your users directly?

Data sources

What does anthropometrics mean to you?

What do you think could help you as far as users info/input is concerned?

What kind of information informs your design decisions, in relation to people/users?

Do clients provide you with information when they present you with briefs?

What kind of information is this typically?

Is it useful/used?

In a recent project what forms of data did you collect?

Do you use any publications (books, magazines etc.) to inform/inspire during the design process?

Which of the following data sources would you typically use in design development -

- Standards and regulations
- Data sheets
- Internal reports
- Previous projects
- Technical journals
- Textbooks
- Academic papers
- Internet
- Design publications
- In-house specialists
- External specialists
- Client

Data collection

What methods of data collection do you use?

Does available data, such as anthropometrics, meet your needs?

In a new project if you were trying to establish user needs where would you look first?

Do you supplement your research with user engagement?

Data management

How do you record your process/findings?

Do you refer to previous projects to inform new ones?

What kind of information is re-used?

Do you ever write-up or reflect upon your process and finding?

If yes, how do you do this?

Do you have any formal ways of passing senior designers knowledge/experiences onto juniors/interns?

How would you gather, organise and incorporate the information you found?

Data use

Describe the last project you completed where end-user input had significant impact?

What were you trying to find out from these users?

Did you take any measurements?

Do you have a record of the consultation?

Are you likely to refer to that work again?

Do you use databases or similar resources regularly?

How do you make dimensional decisions for your designs, with user interaction in mind?

Do any of the following contribute to a lack of user data use, please rate, 1 strongly disagree, 5 strongly agree

- Irrelevant
- Dull
- Difficult to find
- Difficult to translate
- Too authoritarian
- Too academic
- Too abstract
- Too time consuming
- Out of date

Process

At the beginning of a new brief what research would you typically do?

Tool use

When consulting users what equipment would you use?

- Cultural probe
- Digital camera
- Tape measure
- Video camera
- Voice recorder
- Other

When considering users which of the following techniques would you typically use (please rate 1-5, 1 being never use, 5 being always use) -

- CAD human models
- Manikins
- Tables of ergonomic data
- Representative users
- Self modelling
- Sketches of usage
- Scenarios
- Imagination and experience

When finding out about people what are you most interested in?

Do you use any user data based software/websites? If so please list them.

Do you use any user data based books? If so please list them.

Do you use any anthropometric data sources? If so please list them.

Please describe any user related tools you use that were not covered in this questionnaire?

Please describe any user related tools you think would be useful to your design process?

Inclusive Design

If a client was to emphasise 'user-focused' design output as a requirement, what would your approach be, would it differ from your usual process, and how would you communicate your findings?

Do you have anything you would like to add?

APPENDIX C (Interview transcription example) – mentioned in Chapter 4

N.B. Name of company and interviewee etc. have been removed

(This an example of one of ten interviews that were fully transcribed)

Participant 6

[Quick reminder of probe and pictures, and designer flicks through them]

Ch: So I'm guessing the idiots guide to anatomy, is the book you reference most often, or something about ergonomics from the picture prompts?

Ci: That's in our studio, because we're doing a lot of medical stuff, so we have to look up a lot of models for referencing for creating 3d models, because we've been designing all kinds of things, so recently, this was a bit of an eye opener, we've been designing vagina's for gynaecological testing, and doctors and surgeons are very helpful, but they do tend to rattle on about sagittal planes and things like that, and you're like "I don't know what that is", so I've been kind of looking at that. And we've also been designing things like the internal cavity in the body, like all the giblets and stuff that go in there, trying to get all the landmarks.

Ch: So you've been creating cad models of all these parts of the human anatomy, and referencing that.

Ci: I think my colleague got it for the studio, but he doesn't do any cad work, lazy bugger. So it's just me that looks at it.

Ch: And there's a picture of core77, where does that fit into your process?

Ci: That's just for keeping myself up to date with what's going on in the design world, I check it once a day twice a day just to see what interesting things have come up, there's a few other sites I do that with, engadget just for pure nerd reasons, it's always good to keep track with what events are coming up and what new thinking is coming up

Ch: And this [picture of a bike]

Ci: My bike. That's my pride and joy, I'm a little overly attached to it, but I spent a lot of time making it myself and choosing all the components and building it, so I built this bond with it, and also ride it into work every day, so it means more to me than just an object

Ch: So personalised and fitted to you.

Ci: Exactly. I just got a new saddle, it's a Brookes saddle, so it's really thick leather, and they take a while to fit to your exact anatomy. They come in this hard stretched state, and over time they deform to suit you

Ch: So you've been breaking it in with your ass

Ci: So yeah, and then it really and truly will be personalised

Ch: So we have a picture here of your studio, so there's a lot of textbooks and folders, is that stuff you would reference a lot or is it just stored away.

Ci: It's kind of stored away. We have a few books that we do reference. Like the other day, it's a kind of strange piece of design, we're designing a piece of medical equipment, that's simulated, it's a replica, so it won't have all the components and parts that it should, so we have to make a stylised version of it, so we got out the old design books, and referenced and looked through things like Dieter Rams and the Bourellec brothers, to see what shapes we could use, and how we make it look nice an simple. That kind of stuff. But mostly online references, basic images searches for things.

Ch: And this is [picture of designer with an ambulance worker in front of an ambulance]

Ci: That was what we were working on, it's part of a trauma simulation, a still from a video, he's a paramedic and there was doctors on site, and my colleague was filming it and he sent the still because he thought it was a funny image.

Ch: [explains the research work, gets consent form signed]. So on this probe I circled a few things I wanted to ask you a little more about. So for user diversity understanding, it asked what would you ideally do, what would you typically do. So for the 'ideally' on an image of what is a young teen, on a motorised scooter kind of thing, you mentioned "in context", so do you think in context is an ideal.

Ci: Well, yeah well what I've found when doing user interviews or observations, you have to take what you can get, but, ideally you want to see them in context, because then you get the wider picture of everything that they don't even think to tell you about, so I would say it's crucially important to get really quality material, to get it in context as much as possible. So if you were asking do I do this typically, I would say I would like to but the reality is you can't always do it. We've been doing some work with the royal college of music, about performance simulation, how can we build a simulator to help classical music performers practice for performance, because currently they don't, so they do a bit of practice then boom, they're on the stage, and we can't be up on stage when they're performing and asking them questions. So we try and get as close as possible, so we take them to the concert hall, and say what's like it when you're performing, what do you think about just before you come on, then we're able to look around and ask do the lights change, do they put you off, you know, what the floor surface like, things you wouldn't think of if you were sat with them in a café or something.

Ch: So you also mentioned in the ‘typically’ section the word ‘empathic’, so that’s a method you use, what did you mean by that, the word empathic?

Ci: I guess it's really about trying to get into the headspace of the user, and the way I guess I would try and access that is by asking questions that are potentially off topic, just trying to build up a really good background picture of what their life is like, what they do, what they like, that sort of thing.

Ch: So that would be an interview, over the phone or wherever, or like you mentioned earlier, just anything you could get your hands on?

Ci: Yeah, anything really, I think probably most times it would come through interview where I’d throw in a few random questions, and another way I would do it is just by mentally… if I’d built up a good picture of them from interviews or whatever, then just try to extrapolate from my mind, and try and think about what they would be doing or thinking or whatever.

Ch: So this kind of related to what you had written here, use people from my experience for reference, so I guess that’s part of the same thing, you would have a picture in mind and you'd have some confidence.

Ci: Well exactly, I think it’s probably quite natural to bring to bear people that you know and how they live their lives, how they would respond to situations. I guess a thing I try to do is try and be more observant about people I meet and talk to and try and store those away, but it’s never written down it’s more because you don't know what part you might want to pick up on later.

Ch: So with user data sources in the probe, you wrote “user engagement” and “colleagues” as the things you refer to most frequently, could you expand upon that a little?

Ci: So user engagement is by doing all this first hand observation, or interviews, that’s actually talking to the people who we’re interested in, so for surgery we went and interviewed surgeons, and actually then got

permission to go and watch them during surgery, and they're quite giving about their information, I had to get all scrubbed up and get on a gown and all that, and there's some guy open on the table, and they're like come over here and see this, and they show off some stitching skills or whatever, so that's that kind of proper, shadowing, and interviewing, and finding out what they do. And colleagues, probably you have to take it with a pinch of salt, it's a little bit of a risky source of information only talking to people that you know and are probably pretty similar to you, but you can't help but to say what do you think of this, or would you do this, just as a first bounce because it's there, the immediacy, you can weed out some shit ideas quickly, just by throwing them at people close to you, I admit it's not a great source of information but it's quite a good first bounce.

Ch: And then low down was design brief and client information, but that's probably because of the kinds of projects you're currently working on, they're quite open at the beginning?

Ci: Yeah.

Ch: So ergonomic literature/software that was next lowest, is there anything that springs to mind about why that's so low?

Ci: Well for example recently we've been designing a lot of medical stuff, and particularly the patient beds, we've been trying to simulate these kind of environments for surgeons to work in, and they normally have a lot of prescribed limits that they have to work within, such as height of table tops, so you're able to find those out pretty quickly on the internet, and it's not been in the remit of our brief to check what those are, you know, we're not redesigning it we're making a simulation of it, so we haven't really been looking at the wider, is it suitable for everyone, that would be beyond what we've been asked to do.

Ch: OK, so I have these 12 themes I'll talk around. So if you were to start a new project and were trying to establish user needs, where would you start, where would be the first port of call?

Ci: First I'd start further back, and look at what I've been asked to do, so if the brief is to design something medical, then I'd find out from the person who sets the brief who's involved in it all. We're doing a prescription chart redesign, hopefully, coming up, and from there obviously I don't know much about prescription charts, other than you get them in a hospital, so I had to ask who's going to be handling these things, and it turns out there's doctors, there's pharmacists, and there's the nurses that do all the prescribing them, so from there we then set out a plan to go and follow all these people around in the hospital, both day time and night time to check where the errors are occurring.

Ch: So you establish who all the users, all the stakeholders are?

Ci: Well yeah, exactly. You need to know who's important in the project to do it, and then you can figure out a plan on how to get the best information from them, and they may not give you all the information, but it's a good starting point.

Ch: So are you generally confident that you understand the people you're designing for, your techniques and intuition give you a good understanding?

Ci: Yeah, I think so. I mean what's always interesting, and I always find this, is that when you do interviews, you learn a lot about how good your questions are from the first one, so I always try and do at least 3 interviews with different people, and you kind of narrow in on what are the most important things

Ch: So questionnaires are something you do think can help you understand?

Ci: Actually I don't use questionnaires personally, a lot. Just cause I think that the kind of information that we're looking for isn't suited to questionnaires. The kind of stuff that we've been doing is mostly trying to pull out specific insights or feelings that spaces or objects create with people, and I think that that kind of emotional qualitative information, isn't best suited to a questionnaire.

Ch: So what, you would use an informal chat, or…

Ci: I favour the informal chat a lot, especially if you can get into context with it.

Ch: Do you ever take measurements of people?

Ci: Well I measure **things** a lot, from tape measures to getting out vernier callipers out.

Ch: Do you ever refer to anthropometrics?

Ci: Not a lot I would say, even if its just for very basic checks, I wouldn't say I get a classic book out and make sure things conform to those measurements.

Ch: OK, so if you could guess at the last time you did take out a book like that, when might that have been?

Ci: Do you need it to be a book, or would the internet be OK. Because I haven't looked at a book since I was a student, but I probably looked up a seated measurement about say 6 months ago.

Ch: So you don't think anthropometrics alone are enough to inform a design problem?

Ci: No, I really don't.

Ch: If you were trying to understand people beyond anthropometrics then, what approaches would you take to understand them? You've spoke about informal chats, so that's one approach you use, is there anything in addition to that that you would use?

Ci: Well definitely, we call it natural observation, so watching them in their context, in the environment, and there are two ways you could do that that work quite well, one is without them knowing, so just keeping a beady out for sort of strange behaviour or that they might be doing, that they're not particularly thinking about, and the other is with them full knowledge, which is often a bit easier, but it does bias the results a bit because they are aware of what they're doing.

Ch: Do you think your background and your interests influence your design outputs?

Ci: Yeah, almost completely. But very difficult to pick apart exactly how, I mean just for an example, and I was thinking about this this morning, that as designers I think we get very influenced by what we're doing or what we're thinking or we're seeing or… and that will come out invariably in what we're doing, the way I noticed that this morning, was through manufacturing processes, I've noticed we've become a little attached to laser cutting, because we've used it a couple of times recently and it works really well, your mind immediately thinks when the next problem comes along, maybe we could laser cut something for this, and you notice it with designers a lot in interviews they say something like I got really into expanded polystyrene, and decide I was going to make something out of this material. I think you go through fads of influences.

Ch: So inclusive design, if a client was to emphasise a user-focused approach to you, do you think you would change your design approach as it stands now, or do you think…

Ci: Not really, because of what we do, and the way that we sell ourselves we tend to do that anyway, and I think it has a really good impact on the client anyway, because if your able to build in some of these stories and your able to show them to them, the clients we've been working with recently especially, they get really excited where the ideas come from especially if your able to say I saw so and so, and I saw him do this, and actually I've taken that insight and I've turned it into this idea, they get really excited about the story of it as well, and that helps to sell it to them.

Ch: So say your end user was someone outside your realm, say an 80 year old or a pregnant woman or someone like that, an extreme that is very far removed from who you are. Would you have any approaches to say understand them? Say the pregnant woman. What might you do?

Ci: Gosh, I think I would just try… the way I try to approach these things is to keep a very open mind, and try and put my own personality aside for a while, and then try and see what it would be like to be them. I find this a lot anyway with interviews and also, it might be actually be a sort of cultural background kind of thing, I tend to do this a lot anyway, I kind of emulate people I'm with anyway, so I think that kind of mirroring is a natural response for me, to find out what it's like to be them, and try and fit in with them as well, I think probably trying to be as open minded as possible, not impress too much of my own personality on the situation. It sounds like a particularly basic message, when you boil it all down, but being in the company of the people you're interested in is a good idea to me.

Ch: Do you have any typical routes to these people?

Ci: At the moment we've been kind of laid on a plate. We just have to say we're looking for a junior doctor, and they'll sort it for us. Or maybe then we'll realise we need a senior doctor, and we just ask, and again they'll find someone. Because it's very specific what we've been doing, so the client will sort it out. It's all through a gatekeeper, otherwise it would be difficult for us to get time with doctors and surgeons, it's been very useful to have someone that can vouch for us, they get them and tell them we're doing interesting work, and it makes them more inclined to give us time.

Ch: What about a non-surgeon or non-doctor, joe public, have any projects in recent years required you to get a hold of those kind of people.

Ci: Not really, it's all been through gatekeepers, like I say it's been mainly medical simulation, and some musical performance, so no not really.

Ch: So what would be your take on diversity, trying to understand that, different backgrounds, ethnicities and so on. So say for a day-to-day products, is this something that your approaches could cater for, understanding this diversity?

Ci: Well I hope so, I think it's a really good idea, everyone sees things through different lenses so, whether it's a social lens, or a cultural one, or a financial one. So I think it would make an awful lot of sense in the design process to see how other people respond to your design solutions.

Ch: So you would use the same approach as with these medical environments? Try and get in amongst these people, or….

Ci: I think so, I mean I guess as a route to finding people, we've done this in the past, is to use the network of people you know, and try and get them to think of someone they know one step removed, or even using things like facebook to find people that are friends of friends.

Ch: OK. Now if I was to go through a list of people that might influence your design thinking, people you would typically consult, can you tell me if you agree or disagree. So your work colleagues?

Ci: Yes, I suppose

Ch: Friends and family?

Ci: Yep, definitely

Ch: People you've just met

Ci: If it's people we've arranged to meet, I would rate it highly, because that's often doctors, so they're experts.

Ch: Do you use design ethnography often? You've mentioned shadowing etc.

Ci: It is something we do, I do, and I do it without even meaning to. It's something I've kind of trained myself to do. I mean I was at a classical music concert last weekend, and for some reason I started counting the

different kinds of people in the audience, I had a balcony seat, maybe I wasn't enjoying the music that much, but I just started going, making strange observations like 60% of this audience have grey hair, or people in the audience tend to scratch their noses - at least one person would do that every second. Really strange things, but once you start looking for these things you can spot them, these little patterns or strange behaviours.

Ch: So you were spotting patterns, is that typical, something you often try to do to understand people?

Ci: I don't know that I try to do it, I just find myself noticing things.

Ch: Is there anything else you would do, that might fall into a roughly ethnographic bracket?

Ci: I guess reading, reading articles, magazines, newspapers, whatever, they tend to give you a collective view of what people are doing, what people are like, trends, peoples responses to the economy, the environment, you get an overview.

Ch: Do you think day-to-day life of people and insights into this can help your design process? You mentioned earlier that people might do things they don't even notice they do, and your observations of quirks. Do you think this forms part of your design process?

Ci: Absolutely, that's very important, to try and understand people's life better than they understand it.

Ch: If we were talking about information for your design process, is there any forms you prefer, images, text, video, statistics? Say you were tackling your project, and you were trying to draw information and inspiration out of sources, is there any kind of information you would tend to be drawn to?

Ci: Ehm, definitely visual, when I start a project I have 2 hats on, one is a very reasoned analytical one, where I like to have something to read, and I anally draw lists of things I want to try to approach, in terms of gathering information definitely visual, and you know whether it's stills, stills probably more often than video, because I find going through video quite tedious, whereas I think I'd be more happy to have a still of something and try and pick it apart than being distracted by things on video.

Ch: So in your most recent project, did you collect any kind of data - stills, video, anything else?

Ci: Tons. Stills and video, ehm, well other things that spring to mind would be, mappings, things I draw myself of spaces, movements, scenarios, environments, where peoples attention is focused and what they might be doing at that time, so kind of event mapping, as well as physical objects.

Ch: Good, OK, interesting, that's quite a lot of data. Do your clients ever provide you with user information?

Ci: No, almost no information, we have to go and find it really.

Ch: OK how about literal measurement, if you were making design decisions relating to sizes, what might you do?

Ci: I guess we would start by looking at what was already there, and then drawing analogies between things that weren't possibly related but maybe had a similar function or use, then it would be a first bounce with friends and colleagues, and then when we thought we were getting somewhere nearer the mark I would do a focus group or workshop or something.

Ch: OK and for understanding less literal measurable things, say needs and wants, do you have any regular approaches to that kind of criteria?

Ci: That kind of thing, I would definitely put down in terms of questions, and then from there once I'd been able to think I understand someone and where they're coming from, sometimes I get a bit anal and I write down lists of what I think key drivers are in their life and what is important to them, and if they were going to make a decision what would they base it on, and just general words that describe their lifestyle, and from there I would feel fairly confident about trying to extrapolate how they might react to a certain object or circumstance or whatever. It's a way to organise and remind myself.

Ch: So when you're recording these user findings and insights, it's lists and images, and…

Ci: Yeah yeah, well images definitely, they're the first and foremost thing I'll go through, because if I see an image I'll be able to remember the conversation I had, and things like body language, where we met, why we met there, environmental cues

Ch: Do you use any other methods to record?

Ci: We do recordings of interviews as well, but what I find works best, is if, this is something that me and XXX have developed as a double team, if there's two people then you can have one person asking the question and one person making notes, or one looking through a list of questions to make sure you're not missing anything, but I always think it's good to have one person that's maintaining direct eye contact with someone, picking up on what they're saying, rather than just thinking about the next question you have to ask, if you have one person that's actively engaged in a conversational way and can meander off, while another person is keeping note and taking a more managerial role. Typing up as we go along.

Ch: OK and keeping on this idea of team, do you have a good knowledge of all the previous projects you have worked on, separately and together?

Ci: I think so, I've actually thought of it in the past, when we've approached a new project, I remember people we've interviewed for previous projects, and I've thought if I put this person into this situation what would they do, so you have a little bank of people, and you can sort of reanimate them to respond.

Ch: OK so is that all within your head, what you can remember about these people, or do you actually go back to projects, or something stored?

Ci: Most of the time, if it's within the creative phase, I won't actually go back and look through, I'll just draw on my memory of them. Though I think I would try and go back and flick through some images, I wouldn't properly read through stuff, just images.

Ch: And would they be easy to find?

Ci: yeah, we're pretty good at cataloguing, just through aperture, and organising things into projects.

Ch: So the information you reuse is from your memory of who they are, and you reuse images. So say you are drawing on one of these people from a past project, what is it you're trying to recall about them, physical stuff, personality…?

Ci: Everything. Everything I know about them, if I was trying to find someone to really test out an idea with, then I would include everything I remembered about them to pit the design against, whether it was their lifestyle or whether they had two kids, or if they were diabetic - throw everything at it.

Ch: So you document your process quite well, through aperture, and anything else.

Ci: And note-taking basically.

Ch: And do you consciously do this, take the people you've worked with and store them.

Ci: I don't have a folder that has like previous users in it, but that might be quite fun. I think it might be hard to find the time to set aside to say right I'm going to have a folder on my computer that relates to that person in particular. I think I would just go to the project folder and flick through the pictures that relate to that person.

Ch: So the system you have is basically you have a project and a folder relating to this project and you have everything stored in there. So is that effective, or do you think it could be improved?

Ci: It could be improved, everything can be improved, but for my needs it seems to work. I mean it's difficult, when we do interviews, and we go back through them, I will make notes of where something interesting has been said and the times, however, after the project I don't think I've ever been back to the recording to find that particular vox-pop, I'll just read it, my note on it, but I haven't gone back and re-listened. So I tend to file things away, but they'll remain filed away.

Ch: OK then, what you were saying about being able to pick apart images more than video, would you go back to an image and unpick it that way, re-consult it almost with a new problem in mind.

Ci: Yeah I would, definitely.

Ch: Video then, say you had a video of a day to day, environment or situation, say someone preparing something in a kitchen space, do you think that's something you could go and find new insights from new information from.

Ci: Yeah I'm sure you could, if you had a different angle you were examining it from that, you could definitely pull something new from it.

Ch: How do you think that would that compare to a still image of the environment?

Ci: It would give you extra things certainly, you would be able to pick up things that you wouldn't in a still image. Like, whether they were having a conversation with someone off screen, or how absent-minded they were, or the order they were doing things in, all of those are useful things. But I would tend to have in my mind a record of what they were doing at the time, and I would use the image as a sort of reminder.

Ch: So do you ever then, reflect on, you seem to have a good mental store, do you ever reflect back on previous projects. See how they might apply to current projects?

Ci: Yes, but I don't set time aside to do it. If something relevant from a previous projects occurs to me, then it occurs to me as I'm doing it, I think my mind will make the link and I'll then I'll think oh yeah didn't we do this in a previous project, and then I might think about it or go back and dig up some images.

Ch: So when you've got a new project, do you gather material, do you organise it in some way, or are you kind of reactionary in that you see something that needs some insight, you get material and apply it to the problem?

Ci: Information I've collected, I store, I have a folder of useful images I've taken from the internet, I have some old probe packs that I did a long time ago, I store everything. Though I've never looked back at the probes and never done others since.

Ch: OK so the images then as far as incorporating it into your current design thinking, do you re-apply any of them. Say you were organising material for a new project, would you take any of those images and use them in the new project, could they influence you and your clients.

Ci: Yeah I would reuse images, and if it was a good image I would use it, if it was compelling, or had lead somewhere previously and was relevant I would use it again.

Ch: Is there anywhere that you regularly go, to find information - websites, books, software?

Ci: I'm struggling to think of anywhere. Because of the nature of our recent medical projects, I've not really had to look for it myself, it's been set up for us, especially in terms of interviews and things.

Ch: So the information that the client is helping deliver. Do you have explicit trust in that, or is it a springboard to something else.

Ci: I always keep the process as open as possible. If the information isn't good enough, I'll ask for something else. And quite often I'll be specific with the information I ask for from them, I'll write lists, I'll tell them why I want it, and hopefully they can tune it to that. And if we're setting up an interview I might request three people they think might be suitable, ad then I might ask for people with differing experience, or at least a boy and a girl, I'll ask for things that I think will impact the outcome.

Ch: Ok so what are the main things you're looking for when you're investigating a person?

Ci: Well that's quite a big question. It's a long list of things. We like to get a good impression of what the person is like, what they're interested in, how they're going to respond to a situation that we're going to put them in, and try and think about that. And then lots of constraints, such as physical constraints of the things we design. Will they fit into places, so we've been working on mobile inflatable's, that might need to fit into a school hall or an office room, so it can only be this wide by this high, measurement of specific pieces of equipment. But if we're looking at end users, we'll quite often do interviews, to find out what their usual activities are, to try and adapt it into that.

Ch: Parallel activities or…

Ci: Mostly it's task-related, so if we're looking at recreating the operating theatre then we'll go and examine that environment, because that's what we're interested in, we do take it further into the beginning at the end, so

we look at why are you coming to the operating theatre as well, is it an operation that someone's elected to have or is it an emergency case and how does that make you feel, or is it your 2pm, is it the dead of night. Because they might draw on their most recent experience, so you have to find out what their most recent experience was, to set the scene.

Ch: So just to clarify from earlier, for sourcing users, the client does that for you?

Ci: Yeah, usually but we do it ourselves too sometimes. At the moment it's pretty easy for us, they do it for us, and we aren't trying to get access to vulnerable groups or any thing like that, no kids or anything, or people with learning difficulties or anything like that, which would be challenging for us.

Ch: OK so I'm going to run through information sources that could come up in design development, and if you can tell me whether these do come up typically in your work… Standards and regulations?

Ci: Not really

Ch: Data sheets

Ci: Yes, for materials mostly.

Ch: Internal reports?

Ci: Yes, quite often there'll be a white paper in the medical stuff, and they'll give it to us to read.

Ch: Previous projects?

Ci: Yes, whether it's consciously or subconsciously.

Ch: Technical journals?

Ci: Occasionally.

Ch: Textbooks?

Ci: Yes, that anatomy book I guess counts.

Ch: Academic papers?

Ci: Not as a source of information, maybe someone we're working with is submitting a paper, so we'll take a look, partly out of curiosity, but also as a courtesy thing for us, to make sure we think we're being represented fairly.

Ch: The internet?

Ci: That's a **YES**.

Ch: Design publications?

Ci: Yes, if that relates to online. Not physical, unless there's something in particular I want to look at.

Ch: In house specialists?

Ci: No we're too small, but we have a network of external specialist. I mean this sounds terrible but if we have a problem, say there's an electronics issue or programming issue, we have someone we can talk to, if it's graphic design we know graphic designers we can talk to.

Ch: Clients? Do they give you stuff you can incorporate into your process?

Ci: Yeah, they tend to give resources to us. Some of it's quite frightening. For example when we met with the gynaecologist to try to develop this new model for examination purposes, she sent us an email with these links that show on youtube how these examinations are conducted, which was enlightening but also a bit frightening to watch at work. Otherwise you know, I think our clients are medical people and they're keen about sharing what they know, so we often get links or pdf's or youtube links.

Ch: OK, is there any sources I've missed?

Ci: Maybe day-to-day observations, or other things like the tv, that's giving you bits of information whether you like it or not.

Ch: OK so other forms of data, more formalised such as anthropometrics, which you mentioned earlier you don't use very often, if I run through some reasons can you tell me if you agree or not? OK. So do you think it's irrelevant?

Ci: I mean it could be, I don't know how old the sources or how up to date they are. But let me qualify that, we don't often design for mass market, so it's not generally a concern of ours that it will fit 90% of people because we're designing for specific targets. If we were I think I would look more at anthropometric data, but even then I don't think I would rigidly adhere to it, but I would certainly refer to it.

Ch: OK so the thing you said about not knowing the age potentially, would that influence your trust in a source, if it was 20/30 years old?

Ci: Definitely I wouldn't trust it if it was old. I'm just thinking about a very obvious example, the Dutch are getting taller year on year, so if you're a year out you know, you might be completely wrong.

Ch: Do you find it dull?

Ci: Not really. Quite often it's overload, there's just too much stuff. So I'll flick through a few things, and think that's interesting, that's interesting, then that's interesting too, that's interesting, and then I just think oh forget it, there's too much.

Ch: Would you have any difficulty finding that kind of information?

Ci: Good information is quite difficult to find actually. Especially if you're looking at a specific instance. Even statistical information is incredibly difficult to find. You find a stat somewhere, but you don't know what the source is. So you think can I use that?

Ch: Would you use that? Or would it depend what it was for?

Ci: Depends what it's for? I would, in want of better information, but I'd use what I've got.

Ch: Do you find it difficult to translate, can you apply it?

Ci: It varies, looking at mintel type stuff, it's often not quite the information you are looking for, so in that circumstance you use it to paint a picture around what you're looking at, but not getting definite answers on it?

Ch: Do you think it's a bit academic?

Ci: Well, it would be great if there was a place we could go to sort whatever information you wanted, whether you wanted stats, or whether you wanted images, or whether you wanted different types of information, because at the moment you have to pull it apart from whatever you can find, first hand stuff is obviously useful to us at the moment, but if we're looking at finding information from the web then you pull pieces from different areas and then you try and stick it together?

Ch: How do you go about that, the sticking together? Project folder or…

Ci: Yeah a project folder and I probably do a lot of the organising when I come to create presentations, because that's when I'll structure the data to show someone else.

Ch: Do you write reports typically.

Ci: Yeah for every project, generally a couple of reports, we'll do a research report, and a concept report.

Ch: Do you find it time consuming to do data searches for a project and use that data, I mean when justifying with clients, the time constraints and the likes?

Ci: We build it into our plan, and tell them we'll need this much time to do this, because we build it in and get the client to see the value in it.

Ch: Do you find that easy, making the client appreciate user based research?

Ci: Often it makes sense to them, if we're doing a project and we say we need to speak to people or we need to set up a day to have some of your people come in so we can throw questions at them or show them what we've done. It makes sense to them.

Ch: Is that just the nature of the medical clients?

Ci: Even the musical ones seem to see the sense in it.

Ch: Well that's us. Unless you have anything you would like to add to the topic as a whole. Information and empathy and how you understand users for your design process, how you organise this understanding and the likes.

Ci: Yeah, in a way it's quite personal, certainly it seems to me, having explained it you, it seems a very personal way of doing it, and I'm wondering is it personal for everyone, or is everyone following basically the same steps. But I guess your own internal filing system helps you draw links from previous experiences, so I guess if that wasn't working well.

Ch: Well there have been some consistent trends in the interviews, but I think from what you've told me your studio seems a bit more aspirational and user focused, so I'm looking at some studios and not seeing that, but your background with XXX and medical related work, it's all very user focused in your studio, which adds up. But I think there's definitely more room, I mean mental recall is fair enough, but I think there is some room for a bit more structure, I mean how much are you really recalling?

Ci: Yeah and I don't know because I can only remember the bits I remember.

Ch: Yeah, so how much might be lost? I think there's some room to somehow capture more in some way.

Ci: Yeah, I think if there was a way, like if maybe there was some kind of tool, but it's very difficult… I was just thinking wouldn't it be nice to pull up people you've met, talked to, interviewed, or whatever, but then you would have to cross reference them on so many different areas, it would be very difficult to do, which is why your mind is so good for that, oh yeah I talked to that person they were interested in sports or whatever and then you bring them in for that reason, or that person she was 95 that's why I'll bring her in this time, or she liked coffee or… Why do you bring them into the situation, you have to rely on all the information you have on them to know how they're relevant to your current situation. Then maybe having a tool where you could collect all your research and just mentally as you flick through, it might refresh things for you?

(End of interview)

At this stage a chat commences about people-centred design, the intention of the research and how a potential resource might develop.

APPENDIX D (Table of themes and occurrences) – mentioned in Chapter 4

Table Appendix D - Themes and occurrences

Participant no.	Category							
	P	D	I	E	S	B	C	O
P1	10	23	48	9	7	12	2	4
P2	7	7	15	7	4	9	0	0
P3	7	14	27	8	9	24	6	22
P4	2	3	17	4	0	5	0	3
P5	2	15	30	3	7	17	13	20
P6	11	13	45	13	13	15	13	25
P7	5	14	18	4	3	3	3	4
P8	4	13	22	6	11	10	6	16
P9	0	1	14	4	10	5	1	0
P10	9	11	29	14	12	14	1	0
Totals:	**57**	**116**	**265**	**72**	**76**	**114**	**45**	**94**

P. - People-centred design

D. - Design process

I. - Information

E. - Empathy

S. - Support resources

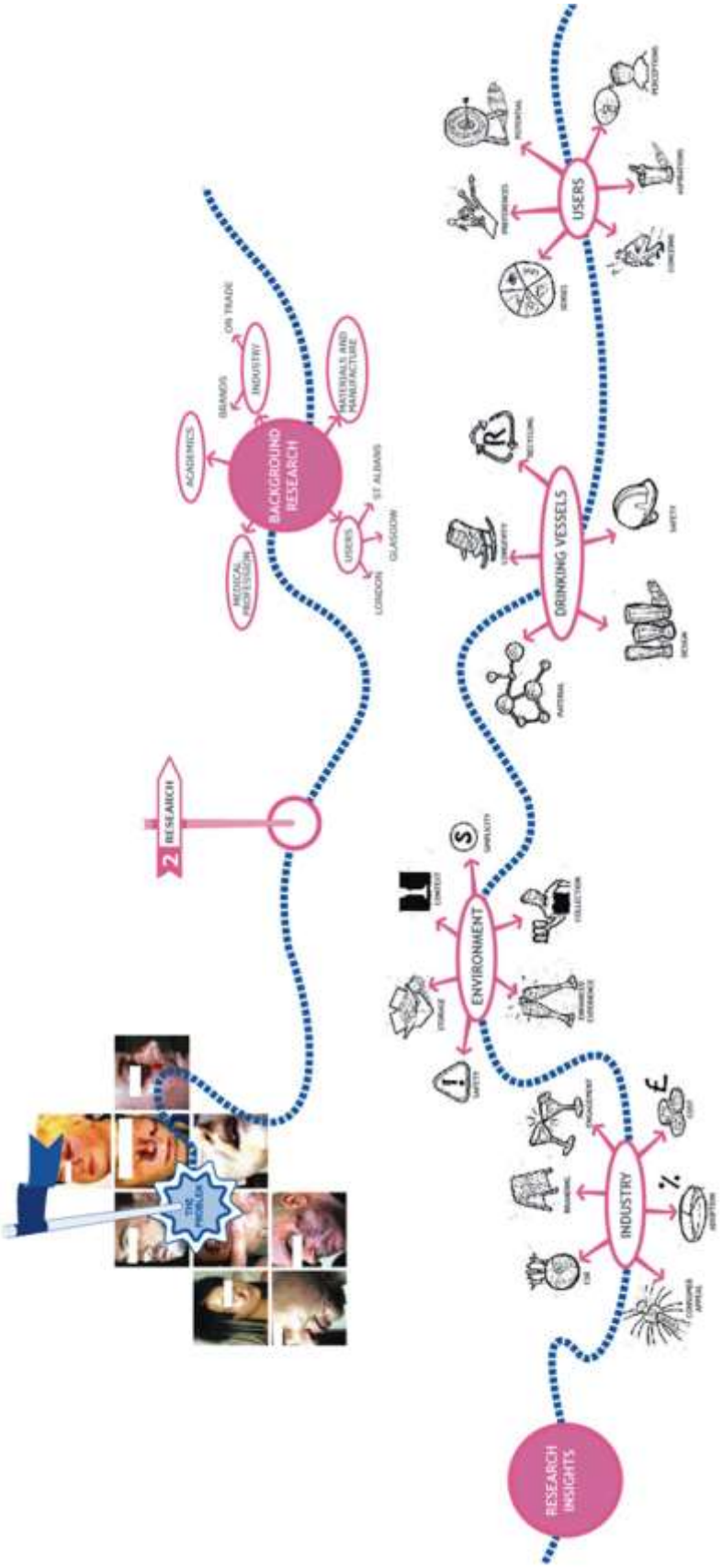
B. - Barriers

C. - Considerations

O. - Opportunities

The interviews intended to explore the participants people-related information behaviour within their design practices, hence were dominated by these topics of information and design process, the participants comments touching upon these areas 265 and 116 times respectively. The next most frequent conversations topics were barriers and opportunities, being closely interlinked, at 114 and 94 respectively. Next was the area of empathy and support resources, at 72 and 76 respectively.

APPENDIX E (Visual mapping of research journey) – mentioned in Chapter 5



APPENDIX F (SWIG interview transcript) – mentioned in Chapter 5

N.B. Name of company and interviewee etc. have been removed

Designing Out Crime – Glass Project (SWIG)

This is a transcript of the interview carried out with a design manager of the company that went on to design the new pint glass, using the research material delivered to Design Council by the research team, prior to the brief being set and bids to tender initiated.

C: So the information you received before the bid (bid for work, made to Design Council). What did that include?

H: That was a pretty clear brief, well a very clear brief. We've had briefs from the Design Council before, so they tend to follow the same format, background of design council, what the objectives are and things. I always think they're set up quite lively, in terms of challenge to designers. That brief had background, in terms of the data that was driving it, police time, types of injuries, and that sort of thing, and then a call for entries under the four categories, and then it was a matter of digging for client relationships that we thought were relevant etc. etc.

C: That leads onto my next question, so you looked at your previous related work, to identify relevant projects?

H: Yep, yep. We looked at our track record at designing glassware, and clients we had designed for and where the drive had came from for those projects. It's kind of 20 years experience in the beers, wines and spirits sector, always from the brand appeal side of things, for the brand world, certainly not addressing it from a safety aspect, but what we did major on was the relationships we had with suppliers and major manufacturers to be able to dig at that depth of detail.

C: So I suppose you appreciate the issues from a branding perspective in regard to what these companies are looking for, and if you can apply that with a safety aspect then it's an all-over win?

H: Yeah, so it's a, sort of, the technical language that needs to be used with the suppliers to try and get the performance criteria on different materials. Yeah, because some of the briefs were saying we want to demonstrate our understanding of a whole range of materials.

C: So you maybe worked previously with polycarbonates, and materials like that?

H: Yeah, well PET and things as well so where there had been precedents for glass and things, beer bottles in central Europe say. So it was, here's why we think we're suitable to do this task from an experience point of view, and here's some case studies that can prove it (RESEARCHERS NOTE - the possible value of reflection as a means of having well packaged work to inform and win future projects). Here's the people, particularly from our structure team that have skills that can deliver it from the technical and creative point of view and then certain members selected from a sourcing point of view and also from my background, I've come from a government agency background as well, so dealing with different stakeholder types as well and so on. So that was put together by XXX, who was our overall 3D leader, who are the right people for this job rather than just, this is the team.

C: Sounds like a great approach, especially with the stakeholders, as there are so many different groups to please, in very different ways.

H: Yeah, it's quite political, and because it's public money as well, we need to be more sure we can deliver value for money and we need to be sure we invest time considerably on top of the budget that's available to make sure that your getting real value for money.

C: Just on that public money note. Do you think that in this particular project that consulting the public is more important than normal, as there will be reports in papers, lots of opinions, and people making comments.

H: I think it's just as important, and I think we have to show a real insight into the consumers, drive, need, response and be really confident that what's being delivered goes above and beyond what's already out there

in the market place, because there's always a risk that people will say you've re-invented the wheel, or there was absolutely no need for this in the first place, what's wrong with what we've got. So we have to demonstrate a massive benefit to the consumer and a real allure, as opposed to something that's just a safety glass, that's our role, for it to become much more of a valued experience, than just something that's, as I say, a safety glass.

C: When you won the actual project, did the Design Council provide more information at that point?

H: Yes, it was very familiar in terms of a typical client briefing in that the initial brief is for a pitch, so you have so much information that the client gives you and you can dig deeper and the doors are closed if you want more information, but then when you're the sole successor as it were, then there's a whole further conversation between client and agency to, you know, getting further insights into the project. (RESEARCHERS NOTE - The content and time difference between pitching brief, and project brief is worth exploring. There is typically a period between pitch and decision, during this period there may be the opportunity, to develop a design brief for designers, or to populate a tool with relevant data for the team that takes on the project)

C: Did you find the information the Design Council provided useful? Was it used or did it just end up sitting on your computers and never referred to?

H: Yeah, I mean this is always the risk isn't it, because people give you a huge amount of information. I mean when I just saw it, I thought, "gosh". Often a brief into the creative studio can be just a very visual image. Visual image, when is an image not visual? What I mean to say is it can just be based around one image and a statement, and then the creative process starts from there, so when you look at this wealth of data you think gosh. We work as a creative team and a client servicing team, myself and one of the client managers sifting through a lot of the information, to then start a very specific brief into the creative team,

cause we don't just go there's the client stuff then just fill that into the creative team, and then say OK come back to me in a week with what you've got. It's our role as the client servicing team to distil that information into a manageable brief for the creative team, and we have a sort of kind of kick off session with the creative team which is, yeah, we do a formal briefing document, uhm, to capture the mandatory user, what the deliverable actually is, the dates the times, all that sort of thing, and then we have a kind of, yeah, creative discussion around what might be possible what might not be and things as well, we tend to actually have a brainstorm prior to us doing a pitch actually, so before we actually put a proposal into a client we'll talk about what are the possibilities for this project given the finite information we have at the moment, so then if we are successful in a project then it's not just kind of, "this is the first we've heard of it", the creative team tends to have done some thinking on it beforehand as well. So yeah we distil the information down. Now when the design council gave us the research it was all sort of nicely ordered and stuff, so you could go into what type of stakeholder types, and what was nice as well, was there was different types, it wasn't just all here in one big document, there was video footage, there was imagery, there were diagrams, there was data driven stuff, there was testimonials, it was all sorts, there was a real range, because different people within the creative team, and also the client servicing team, can latch onto and understand different types of information as well, cause I guess everybody has different learning approaches as well. (RESEARCHER NOTE - this is exactly what we were looking to achieve, and reflects the design brief FOR designers)

C: So do you find any like, trends, say, when you're distilling information to, create a creative brief, do you find there's certain things, like forms of information, or I don't know visuals what have you, that work a little better for the creatives?

H: There's no hard and fast rule, other than we do like solid data, it sounds really funny, but statistics and things like that, and weighting towards, sort of the, mainstream audience for the product, that's what we

prioritise, we have to try and prioritise some key ingredients over another, and that's what helps filter the designs, it helps us when we are assessing internally to be able to say, is this really fulfilling a need and how well is it fulfilling a need, is it adding a benefit and this sort of stuff. This document was extremely useful (the report), what we kind of decided early on, was that we would give the designers the overview documents, there was a really useful summary document, that had just recently been finished which was about 10 pages, which strung all the element from the policing data through to the technical and the material type things, so that was very useful, so we would give them that and go through it with them as part of the briefing session. But this all of us just think this is an excellent piece of work, in terms of being able to distil information into a stimulating document, which is you know, 6 months research, to be able to distil that into something that is manageable and, yeah interesting as well, it was really interesting to navigate and stimulating as well, it would be a great briefing template for so many people to use, on a very complex project I think. So whoever paid for it or produced it, it was well worth the investment I think, because, what we decided was we'd give this document (report) plus that overview document plus that (CHECK PICTURE TAKEN) to the designers as their starting point, as well as the other stuff that we did, because we did our own audits, one of the things that we did feel that was a bit lacking was insight onto the on-trade requirements, and one of the values that we thought we brought, is that we have several clients that are actually beer brands and brewers, and some of them have licensed premises as part of their estate, so we contacted some of the procurement managers there, and had our own audit with them, so went behind the scenes with them, and got what were their issues, what was their experiences, what were their thoughts on it and things as well.

And this is the only problem I guess, about having one group of stakeholders to do the research phase and then another to do the branding, and then another to do say the launch campaign, is that, each, I suppose, you don't have a drop in information, but there's no substitute

for the direct experience, yourself of doing it, so where it's really great to have the video footage of the different punters and things like that being asked about safety and their drinking experiences and things, it goes in, and the creative team register it and stuff, but when they're there themselves hearing that, experiencing it, asking those questions, it's just slightly different, as to whether that information goes in and… I think it will always be the case, isn't it, is yeah, there's no substitute for the face to face interaction yourself, and going through that experience, but the way in which this was presented and being able to get the different types of research methodology by video footage and more interactive types of research made it extremely useful.

C: Yeah I think that's key to my PhD, you'll never beat face to face, but it's so time consuming, difficult to arrange, difficult to get the right people.

H: Well this is it, we struggled enough just to get 3 of our creative team on a one-day visit to go and see this procurement guy, and that was only one aspect. But yes, this (report and resources), literally just showing the journey and the different people involved in it, and what this prompted was that when we started the concept phase, if there were things then that were unclear, we would then dig deeper into the more detailed research we had with the individual interviews, and the different data sets of injury types, and testimonials and those sorts of things, so we kind of took it upon ourselves as the client servicing team to be the filter to go and dig for that information to corroborate any of the assumptions we made as a result of this material, and anything that we felt we needed to support the concept development work further.

C: So would that be instigated by the creatives, would they come to you and maybe say "we're thinking about this statistic", or this "element of violence", can you check, or would it be the other way round?

H: It would probably be the other way around, in that they would develop something, based on an assumption from this research and things, they would develop a concept or a use of a material or an approach or functionality of concept, and just to, I guess it's more due diligence on our

part as the client servicing team, is to go away and just double check that and go and feed into the clients. But we have reviews, sometimes every day, but this is the kind of project, sometimes you might only have 1 or 2 reviews a week on a say 3 month project or whatever, based on client timescales, but on this one we did a lot of talking and thinking around the subject before even getting into the creative work, ehm, bouncing around what are the platforms that we then translate the research into to take the ideas forward, more often than not you can get into a concept phase relatively quickly when you're given a product design brief, but this one we took a lot of time to filter and do our own assessment, so what are the pros and cons of what is out there already, based on what this taught us (research work) and our gut feel was as well. What's the pros what's the cons of the current pint glass, what's the pros what's the cons of the polycarbonate alternatives, and that was our kind of quick and dirty filtering.

C: Was any of the material not useful, unused?

H: Because we're still in throws of the project, I would say nothing is unused at this stage, because we still want to draw on as much as we can, even at this stage, we're already at the creative phases and stuff, but we're constantly going back and double checking research and stuff.

C: And all that was missing really, was on-site, on-trade?

H: yeah things, like literally going behind the bar and seeing the storage facilities.

C: So things like how they stack, how they're stored, how they're received when delivered and things?

H: Yeah and how often are licensees buying glasses. The thing is sometimes this data may well be there, or at some point it may well have been asked, but we haven't got it, or we might have not dug deep enough into the way it was cited and things.

C: I can't even actually remember whether we included that kind of information, they were questions that were asked, but along the way it might have just disappeared. This is one of the things that's quite tricky with it, is that people that are carrying out projects have this sort of embedded knowledge, then when they try and put it across often it's just lost, which is what becomes difficult if you're, especially if you're handing something off to someone, or say a senior designer has worked on a similar project and then they give this project to the juniors, how do you transfer the knowledge?

H: There is a drop in knowledge. We have a chart that we use, which shows the sort of drop, is it the knowledge drop? Rather than one agency handling something, you have a research agency then you have an innovation agency and then you have product design agency then you have a communications agency, each time there's a little drop in knowledge.

C: Ahh, ok.

H: I'll try and find the chart for you it might be quite interesting.

C: Yeah that would be interesting, to put in, because it's definitely something I'm witnessing. It would be nice to see, if someone's charted it. Is that yourselves that have produced it?

H: I'm pretty sure, one of the guys from our strategy team, but I'll double check, in case it's propriety or you need to credit it or something. There was something I was going to say, oh yeah, one of the challenges you always have on a project like this is, a key thing for commercialising this is the cost, so we would be like what is the unit cost of a pint glass already, what are we working with basically, because that's going to define what's practically within scope, in terms of materials we choose to use, and the volumes and all those kinds of things, so we're looking for a that very sort of factual data about how much it costs, how many made per year and all that sort of thing to be able to benchmark against, and that data was there in terms of volumes and things, and the costs would

be very very difficult to pin down because it's so commercially sensitive, and also no glass supplier is going to engage with you until you're in a sort of commercial contract type situation, to be able to get to a unit cost, they can give you such a range.

C: Yeah we found that difficult too. Even with on-site, with bar managers say, we'd ask about polycarbonates, and some would quote three pounds a vessel, and others would maybe be like seventy pence? So it was difficult to gauge, how does this work, what we're being told, is someone being very badly conned or…

H: Yeah that's right, in the summary document where it referenced a pint glass versus the cost a toughened pint glass versus the cost of a polycarbonate, our natural assumption was that that was the price from a glassware manufacturer to a brand or something, but then just quickly researching it on the internet, no that's almost like a consumer price so the RRP almost, so we then sort of said ok that then means we need to work much more closely with the glass suppliers in terms can you give us a unit cost for this, realistically, in terms of the original price before it's sold onto the brand and all that sort of thing.

C: Have you dealt with British Glass?

H: Yeah, British Glass and Glass Technology Services, yeah so they can give obviously price per tonne, and things, but once it's converted, then that's got a different cost, and the amount of processing detail that we build in can have a real affect to.

C: So because this (study) is all about the users, I don't know if this applies, but do you use a lot of user based information, so the user I guess would be on trade, but would also be the customer at the end of the day the person that drinks from this vessel.

H: Yeah, this is the creative brief, oh here's my card by the way.

C: Ah, thanks very much.

H: We built a creative brief from the research that was fed in, so what's our objective, in that, so whilst it has to be a safer drinking vessel, this has actually got to become, must have, really attractive proposition for the consumer and for the commercial operations side of things, so why are we doing this now, that's always the first question that designers ask "why are we doing this now? Why is there a finite deadline?" all that sort of thing, so it was kind of the hard facts that the research gave us, and then also, we would normally call this our sort of big brand idea, but here what's the underlying principle is that we're saying from the start there has to be a benefit to whatever it is we've developed, and as a by-product safety has to come in.

C: Sure, sure. So you're going for a stealth outcome then, so it's going to be an invisible type solution. Is that the approach?

H: That's, we feel, that that's the approach that we should take, because otherwise, it can feel too much like I suppose a nanny state position, you're telling me that I need to behave differently, you're making an assumption of my behaviour and those sorts of things as well, and sort of trying to visualise, we're talking about one end of scale to another in terms of who this needs to suit, ultimately, or who this range of solutions needs to suit, yeah because we came to the realisation, and from the way in which the brief was put together, that this wasn't a one size fits all, it's about creating choice for the licensees, once you come to that, then that's more helpful than saying we're trying to impose this one type of vessel on everybody, because that's the perception that's in the public eye at the moment, it's sort of the British Beer and Pub Association, when this came live this project, their assumption was that, oh they're going to make everyone, it's a blanket, all switch to plastic glasses, it was like "where does it say that."

C: Yeah it's really difficult, I guess because it's the emotive thing. In the Glasgow case, I went back to Glasgow because I'd worked in bars there, so I knew people back there, one of the other researchers St Albans because it has the highest pub to person ratio in the UK supposedly, and

the third that we did together was in London, because we're based here and because it's quite multi-cultural. There was a similar response in Glasgow when they tried to put a glass ban, well they put a glass ban in nightclubs, but then they then tried to roll it out into bars and cafes, and there was this huge backlash, but it was this thing, it was a nanny state approach.

H: Yeah. It's a nanny state approach and it's a stigma I think isn't it, and one of the things that we, that's pointed out here, about plastic triggers a nanny state approach, and also the fear that if I approach a certain kind of venue and it's serving drinks in plastic, then that type of venue is that, is that really where I want to be going. Yeah, here (reads from report) "there must be a lot of trouble here" and that kind of thing.

C: Did you, to take these statistics, but also like say more of an opinion type thing like "there must be trouble around here", was that stuff, that was your own intuition or was that from speaking to people or was that from research that you received.

H: It was a combination really. Yeah. It was our take out of research we received also our own intuition and yeah it kind of all adds up, it was a kind of mix of that, but where we have statistics and things, we know we can easily reference back to those statistics.

C: Do you mind if I take a quick picture of that, of the two different guys?

H: Yeah sure, yeah, because we were trying to get from one, it's one extreme to the other isn't it.

C: So you have the CAMRA guy to the chav.

H: Neds and chavs yeah, that's right. And that sort of thing being able to visually demonstrate that for creatives, is easier than saying from the beer aficionado blah blah blah to that, two simple images like that on scales helps, because you know, trying to bring a character or a personality to somebody helps position it, and also for marketers and

things when we're trying to judge and filter our concepts and things, it's helpful

C: So you would, maybe not so far as a persona, but you would at least have an indication of the type of person?

H: Yeah, yeah that's right, actually what we referenced here was as well as information that you guys had given us, we also looked into our own consumer trends and product launch stuff that we do, so we have an insight team here, that, they will develop sort of insight reports for categories, well it's client specific stuff, but then they do sort of proactive stuff around a whole category, and because we do quite a lot in beers, wines and spirits FMCG products and stuff, they'll be delivering those presentations, and I'd remembered one that one of our insight team had done on beer occasions as we called it, rather than beer consumer segments, the assumption is that we can be a range of different consumer types, depending on the occasion that we're in, depending upon the environment we're in, because there's always this concern that if you dangerously segment people, then you polarise them as well. So what we built in there was our own consumer trends, so 7 different consumer types depending on the occasion so anything from the kind of hedonists through to aficionados, routine entertainers and things, what we felt was quite key in addressing the hedonists and making sure we're fulfilling the sort of safety element for these guys where the biggest risk is, is not alienating these guys, the aficionados that really value the beer drinking experience and don't want to have sort of taint issues even if they're perceptually rather than real and things as well, it's about trying to make sure that we're fulfilling their needs as well so for each of these we're sort of describing the consumer type, but we're also looking at in market examples of how those things are conveyed as well.

C: Do you mind if I take a picture, I'm quite interested, in the project I mentioned with XXX, XXX. We created personas of different kinds of patients, family members, and we started to try and describe their personalities etc., with a mixed response, again it's this face-to-face thing,

we went out and met these people, but when we tried to distil it down, I'm not sure how much it engaged them, it was quite difficult, even though we had images of similar type people and similar type environments.

H: It's difficult because people think they're individuals, so if you try and categorise them, they revolt against it.

C: So it's interesting then that in your brief that, that your designers found these people, almost these polarised…

H: Yeah well occasions, occasions and need statement occasions are very key drivers for a brief for us, rather than saying it's a person say in terms of she's, well female, age this, that and the other, those things are important, but what's more important is what's driving that need, specifically at the moment, and what's the environment, because we believe in brands being part of a whole brand world, so lots of different touch-points, what environment are they in at the time, what are they being exposed to, what's the other things that are going to be on their mind at the same time.

C: Yeah, that's a good way to go about it actually.

H: There was a couple of really useful, I mean there was so much in the distilled document that was all useful I could have just translated it all into the design brief, but in particular there was the very emotive statement around the sensorial aspects of beer drinking, and what we do is all about trying to connect with consumers on the kind of sensorial, well use all five of the senses, so I really liked this, so I just lifted that quote specifically, "the ales and lagers should be clear and bright, and as you sup it" and so on, it really captured things really well.

C: Ah yeah, that was me that, I wrote that… made it up.

(laughter)

H: Oh nooo… no, but it was very very important because it just acknowledged the value of the product, so, and if that's acknowledged then that's what we have to convey, we have to ensure it's to its very very

best potential, and more. And some of the case studies for some of the products that we've designed before, sorted of showed testament to that. We did some work for XXX, and just by the design of the bottle peoples perception, they thought there had been a new improved product formulation, because they thought the beer tasted better, but there had been absolutely no change at all, so that's what you're driving for all the time.

C: It's like drinking coke from the bottle, as opposed to a can, and somehow it tasted better some people say.

H: Yeah, and I mean it's all nonsense isn't it, scientifically, but then emotionally.

C: Yeah, it's the connection, they talk of this kiss of the rim, so it's how it feels against the lip, the textural, sensory issues, and it all adds up to this overall nicer experience.

H: Yeah, and from that we came to some conclusions as well. So in the end, we were acknowledging the environments for use, and the biggest challenge really, we felt was shrouding the safety elements in benefit led propositions, as opposed to having almost a bumper safety guard around the outside, we just felt that that was going to alienate people. And so what we did in terms of the audiences, was break them down into 3 (4) key stakeholder groups so the trade, the licensee, the brand and the consumer, and trying to come up with what was the key drivers for each of those. And from the consumer what we felt, basically there's no disconnect between each of the senses, because what your presented with at the moment if it's not the glass, pint glass, it's something that may look like glass but when you come to touch it, or when you come to have it on your lips or whatever that doesn't connect with the sense that previously registered it and therefore there's a kind of mistrust "hmm", isn't there, "whaaa," which of these is telling me the truth, so that was the trying to get, our ultimate should be something that keeps that connection with the five senses, and if it doesn't there is an obvious reason for it not

to, or somehow it's compensated. So for the consumer it's all about the sensory codes.

C: Do you mind if I take a picture again? Is that OK? I'm not even sure if these will show up to tell you the truth.

H: Well I can always send it to you, if you use them sensitively. So this came about. It took quite a long time to pull this brief together because it was dissecting the information and it was trying to find what is the best way to split out the stakeholders, and document the differences between those stakeholder and things as well, with the different drivers to the consumer.

C: Was that a bit of a luxury, to a degree with the brief. Was it maybe a longer time scale, or do you normally find you have a lot of time to think about it, create your own brief?

H: Hmmm, it's a tricky one actually. Yeah we always create our own brief from the information the client gives us, sometimes it's very easy to translate the information, other times, yeah you need to do a bit more work, but we just felt the process of filtering all of the data that had been given to us, and building our assumptions as to what that then means for a brand experience brief, was the bit that we had to go through again, so this was part of the journey of our own, that we had to take, rather than just take that research, and it has all the answers in it, here's now a product design brief to our designers, we needed to go through this sort of interim phase ourselves.

C: Do you think that then makes you connect more to the project?

H: Yeah definitely, because what that gives us is our own criteria for success, for how we're doing, in terms of, yes it might be fulfilling the safety features, because it has a mesh in or something like that, but is it really going to start to appeal to consumers, so we have to be our own worst critics, well we have to be the hardest critics before it then goes to the client as well, or we have to have something to be benchmarking against, both for ourselves and for the client, because, yeah more often

that not the client has a judgement criteria, but in this case we needed to develop it beyond the safety judgement criteria as well, so yeah I mentioned the consumers as in the sensorial emotional needs, and acknowledging there that actually for the brand, those are just as important because in fulfilling those things you're fulfilling the brands requirements, plus we felt that there was opportunities maybe to customise in high and low volumes, because some of the smaller brands are limited in how they can get their branded glassware on the shelf and things as well, and sort of embedding 3D brands in, what's the next generation of branding if we've gone from sort of just simply printing, screen printing, and then frosting effects, embossing and nucleation, what's next in terms of the next branding opportunity on the vessel itself and how do we really take advantage of next generation technologies as well. And through to the trade as well, we felt that key for them as well beyond the safety side of things, is something that can really boost operations and putting ourselves in the shoes of a busy licensee on a Saturday night, your biggest challenge is getting as many pints over the bar as possible, and I keep going back to a walkabout or something like that and just how quickly they have to serve

C: You don't want to keep going back there

H: Yeah you're right, and just the ability to serve more and more beer as quickly as possible and in the best sort of quality as well, and we came to the conclusion that there's a contract between the licensee and the consumer in that you've done everything in your power to be able to serve up the best pint possible before it goes into to the consumers sort of ownership, so serving it cold serving it clear serving it with the right head and things as well, is all part of the brand experience and the quality contract that you've entered into as well, so the quicker you can make that, and the more efficiently you can do that the better. So, we talked about it in terms of cleaning, the pros and cons of glass, the extremes of it, it can have a very crafted rustic feel to it and it can be very precision, very scientific and things, whereas at the moment, and one of the key

things about the plastic alternatives, is they're constantly trying to emulate glass, there not trying to be their own person, as it were.

C: Yeah, definitely.

H: This has become our judgement criteria, and then this is repeated for the technology brief, because we split our creative teams into two, into the creatives actually creating the concepts and then the team were tasked with the technology brief, so those were that engaging with suppliers to say that's all very well that it looks beautiful, and does this that and the other and things but can it withstand the 400 dishwasher cycles, can it withstand the caustic, does it have food grade certification, and we had to have those two separate conversations, the very emotive ones, the very creative styling ones, and then separate that from the guys that are just doing the kind of can you make it are there any IP implications, is it close to market and those kind of things, so there are two work streams going on in parallel, both feeding into each other on a, well, once weekly at least twice weekly basis, and myself and the client manager of the project being kind the liaison between the two as well and making sure that the two teams talk to each other.

C: And that's a typical way of tackling a brief is it or?

H: Hmmm, probably not actually, this was based on, splitting the resources like that, having those two work streams going on, was based very much on the timescales, and also the fact that for one of the briefs, this is about going into completely new realms, and we don't want to go too far down one avenue and promise the client something if it isn't actually deliverable, whereas often what we talk about with a client might be something that is in principle, we can get to, but we can get to it by several different means, whereas for this early on we know that, one of the projects is 'glass plus' that we want to do this, this is the principle, is it physically possible, and we probably had to have that discussion earlier than we normally would. So that's the technology brief is the build on that. And that was the actual mandatory's, requirements. So that's how we used it.

C: It seems quite concise.

H: (laughs) well it's still quite long although there are appendices.

C: Comparatively.

H: And then what we did to be able to make this more of a, because it's very readable check-listy at the moment and stuff, is to have these as constant judgements, so when we have our reviews, we have three of these one for the trade, one for the consumer, one for the brands, we are referring to, to see are we fulfilling all the mandatories, are there some desirables that we can sort of fulfil and things as well

C: So that's sort of what you'll kind of build a story around, or talk around, are we doing this are we doing this?

H: Yeah, and it's great because it's an environment that we're involved in, in terms of the beer drinking culture, so we can put ourselves in the shoes of the consumer quite easily and that makes it easier when we're having our internal discussions, and having our discussions with the design council, who's the client as well.

C: Do you mind if I take a picture of that, is that OK. So when you, you're have these meetings, I presume that the document would be there and you would maybe refer to it, but it wouldn't be the main focus, it would maybe be concepts and maybe these lists.

H: Yeah that's right, these haven't come out with the client yet, we're just using these internally, with the client because there's already so much knowledge in the room. It's kind of what feels right at the moment, in terms of filtering the concepts, is this really fulfilling the consumer and the trade brief and things as well as fulfilling the safety brief. And they're now encouraging us to classify, again the very useful scale in here, we're using as the basis, because you need some kind of filtering system, so we're developing a couple of different axes for ourselves, in terms of we'll use this one for feasibility, but against the consumer, and feasibility against the trade, and then we'll do another one in terms of the level of

safety that is being achieved, because it's not going to be unbreakable, well one of the solutions might be unbreakable, but another might be more if it does break it's more safely contained, all those kinds of things, so we'll measure safety here against, I can't remember what the axis was, it'll come to me, safety versus. I'll double check. It was only Friday (laughs). So that's our evaluation criteria, so we'll literally position our concepts on the scale to be able to then start to weight those that we're going to take forward to prototyping or not, and we've done our own crude prototyping in house of here are some principles around either containment or controlled breakage or no breakage, we've taken pint glasses and mocked up the treatment that we want to give and then done our own breakage test to say roughly that's giving us what we're after or that was a complete disaster lets not pursue that anymore, or, you know, we need to do more external tests with this one, and that again that direct involvement of the designers themselves, because that could have been something that we'd outsourced or it could have been something that was done in the first part of the project, but you need to see that sort of thing for yourself, and the designers themselves need to be convinced themselves that the proposition that they've come up with either is failing or isn't, because I know that we covered some ground that the XXX covered, but we've kind of built on it as well, and we met with them as well, to have discussions.

C: OK did you go there?

H: yeah well the guys that are doing the technology search, they met with them, and we've met with lots of suppliers. That was the one good thing, when all the press went wild about re-designing the pint glass, instead of us having to actively go out and find suppliers, loads of suppliers phoned us and said we need to talk to you about this, they were either very defensive and said you don't know what you're doing, or they were we would be really interested, and this was the majority of them, we would be really interested in learning more about the project and seeing what we can offer you in terms of materials or approaches, and so that saved us an enormous amount of time, as that did a bit of the filtering for us, we've

obviously to some suppliers we knew previously, but we've pretty much responded to most of those that approached us, most people have been very pro-active and wanted to engage on the project as well.

C: Well that's good. Because I'd sort of lost sight of the project, a little, and I was told there had been this huge response by the public, so I started looking on the internet and there was like one hundred comments on this article and the likes.

H: Yeah, that in itself is great. I don't know if I want this to go on the record, but ehm, one of the emails that we got, because if you make an enquiry on our website it goes to our business development guy, because it's generally sales enquiries, but anything that came in on the pint glass project he was feeding into us, and they were generally suppliers, but there was some from the public, and one of them was "we don't need no poncy design agency, redesigning the pint glass, leave it alone". Which was classic, and I took that one out, and I started our first briefing with XXX and XXX and everyone saying this is what our challenge is to overcome this perception of it ain't broke don't fix it, and the perception that the design industry has of developing things that people don't need, and it's like we're not there. We'd rather not develop anything than something that is superfluous.

C: Yeah, well this is it. That's what's so difficult about this project, you have to come up with something that has real value, and it's a huge challenge, to hit upon all the sensory elements and all the safety elements. I mean I have a design background, and I still design, but even so it's mind-boggling trying to think how can you do this, with all the different elements, it's a really difficult challenge.

H: Yeah, yeah, I think this is why we wanted to split the team, is to try and get the sensory side of things with one half of the creative team, and those that are in the team that are very, well they're all technically minded, the structural team, we all come from sort of product design backgrounds, but there are those specifically that get into the nitty-gritty of the performance requirements of materials and things, and one of our

guys who leads on the CAD data side of things, he's the one that's always challenged with, in all client projects, now taking that creative concept and making it work, commercialising type of thing, so he's really primed to see whether there are coatings and barriers and mouldings and all those sort of types of things that could work as well.

C: They're supposedly working on legislation for the toughening process aren't they, so…

H: Yeah, cause this is one of the things that's came out, always we want to be working to a set of constraints, and so by doing those individual briefs we've set ourselves a series of constraints or parameters that we're working to, and then you think ok what is the ideal at the moment and the ideal isn't documented anywhere, in terms of the toughening standards.

C: I heard a rumour, well when speaking to the XXX, it was something they were looking into out-with this project. But on-site when I was back in Glasgow, there were glasses that were meant to be toughened, there was even bar staff that had been hit with glasses that were meant to be toughened, and they were like "there's no consistency."

H: There is no consistency, and also from what we've been learning, and even if a glass is toughened that toughening quality wears off over time as well, so if it wears off over time, there's no coding in the glass to tell you, it's not like it's got a best before date, and there's no real coding to tells you when something is toughened or just annealed as well, so it is all a little bit cryptic.

C: Definitely.

H: In as much as we know many of the estate owners will only specify toughened glass or put pressure on the brand owners to bring in toughened branded glassware, there's no real consistency to it.

C: Well in Glasgow in all night entertainment venues it was meant to be toughened glass or plastic and no exception, but even still glass slips through, and how can you regulate against it.

H: Also it would be madness for a lot of venues to say well yes this glass has say a 3 month life span so cull it after 3 months, if it still looks like it's doing alright still, you're not going to throw it away.

C: Well, even in the bar, well this is a long time ago now, but I worked in a few bars in Glasgow, in one of them we'd wash the glasses behind the bar, by hand, and as you brought it up, often you'd often give it a wee knock, by accident and most times it wouldn't matter it wouldn't do a thing, but other times it would just, explode, almost.

H: Just explode yeah, although someone was saying that it doesn't happen often, but when it does it's so dramatic that's the stuff that sticks in our mind.

C: Well there's been a lot of studies. XXX, he's, I guess, the one guy that from the medical side, that really knows his stuff, and there's been some papers written on the kind of injuries to eyes that are sustained through toughened glass because of that explosive quality, the projectile element of it, so that it's toughened, and the idea is it's safer but sometimes it can be more damaging, so the eye injuries are often the really bad ones, where you lose part of your vision.

H: And the very name 'toughened' glass as well, makes you want to treat it more, you want to be more brutal with it as well, it's almost a challenge.

C: Yeah that's true actually, you're like I don't have to be careful with it. We thought about that, we thought what if we, what if you made it… you get glasses called kolch glasses they must be German or maybe from Austria, but just very very slim delicate glasses, they serve a short beer in them, and as soon as you hold it you feel this delicacy and it makes you treat it a little differently, it's wee bit dainty, but it's beer and it's a nice beer, and so… it's strange this cultural difference you go to Belgium or Austria, what have you, and it's just a completely different way of treating both the vessel and the liquid, getting a little half isn't, it isn't somehow asking questions of your masculinity, or whatever, you know?

H: Yeah, that's right. It was interesting I spoke to one of the head brewer at one of our clients and was asking him about, things like the XXX glass, about saying it had been developed to maximise all of the sensory experience, asking him to corroborate, and he said it's so wholly wedded to individual brews that you wouldn't want to say either way, but he was very keen on the kind of chalice type glasses, the way they're more delicate, and also half pint and 1/3 pint glasses and things.

C: That's interesting the whole 1/3 and 2/3's area, that's a whole new world.

H: yeah my granddad used to always say never order a pint only order a half pint if you're in a new pub, and then if you don't like it you're only stuck with a half pint as opposed to a pint, it was a very practical approach, if you like beer then that is the route you should be going down.

C: Yeah I went to a beer festival, and they give you a glass as you walk in marked with I think a 1/2 and 2/3's

H: yeah I've been to the Reading beer festival quite a lot.

C: Research?

H: Yes always every year, knew it'd come in handy this year.

C: There you go. Well it's interesting, these connoisseurs are like well, like your grandfather, I want to try it, I'm not going to commit to a pint until I've tried it.

H: Yeah a pint of something that tastes awful.

C: I actually have one of those Samuel Adam's glasses I was in America for a conference and I saw one, and went hmmm, I'll have that.

H: Yes, there's been a lot of nicking for this project.

C: I don't know. My girlfriend is constantly taking it out of the glass cupboard you know, so it appeals to her for whatever reason. I don't know it's quite similar to, you know the XXX glasses that you get from… XXX I think it is, that's meant to take some of the impression of the bottle, the curvature. It's kind of that same sensation, it's that same tuliping out. I don't know it's maybe overly elaborate, plus as far as on-trade goes I think it would be a nightmare, because the profile is all over the place, and you couldn't stack it.

H: Yeah even though you're not meant to stack, they generally do still stack them for storage, so it's a consideration.

C: And I think a big difficulty is that glasses left in the drinking environment, the more build up of that, the more chance of an accidental breakage or if there's a flash point and someone reaches for whatever's close at hand, and there happens to be a pile of glasses there. So then the way to get around that is that you do stack them up, and you're efficient, well you can get the little carriers are but again staff and glass collectors tend to stack in them as well, so it's still stacked. I'm sure you've saw this high, what is it H.V…

H: Oh yeah High Volume Vertical Drinking, yeah I've became a knowledge base on all sorts of drinking terms, but only because of the research.

C: It's really interesting it just makes you consider your whole drinking experience in a different way…"Oh! I was in a place like that last night, oh no."

H: It's true, and these places that look really quite soulless with no people in them, but then you fill them with lots of people standing up drinking and it changes its environment completely.

C: Definitely. Let me take a wee look at these questions.

H: I have about maybe another10 minutes, is it useful so far?

C: Yeah, yeah, a lot of it I'm just interested in myself generally, but lets look at these questions make sure I'm getting everything. What about more generally, when you have a project and you're trying to understand the customer, the people you're actually designing the objects for. What's your approach? Do you refer to certain sources, do you go meet people, do you have books? Say like, say you were designing this glass (picks up glass) and you wanted to understand what people were looking for and dimensionally what would work, do you know where you would go, how you would find this kind of thing out?

H: Yeah, always we would look for opportunities to somehow track the user interaction, and whether that's through just watching and stuff, and we're all consumers here so the first port of call is always to have a quick and dirty user experience forum here, with different consumers, and then everybody has links into different people, different user groups, different passions and things as well, so that's the first thing that, we either do that as we're gathering knowledge for pitch proposals and things, or finding specific experts or sort of people that are passionate about those projects within the organisation, but then also partnering with, well we have research partners that we use for either quant or qual, and all the data that many of our clients use themselves, and the different sort of research libraries that they have as well.

C: So the client would typically give you some data as well?

H: Data, yeah, but we always try, where possible, to help in terms of setting of the questions, our strategists always want to be involved in setting of the questions or stimulus, we have a whole range of different ways in which we can present new brand propositions and things for new user groups and things like that, so we'll always try and be part of that, and then also try and attend as well, we'll sometimes do that at the cost of the client but more often than not, that's something we see as essential so we'll do it anyway, it's value add, because you learn so much from those forums.

C: What about, like more hard data, maybe like dimensions of people. Dimensions of the hand, would you ever look at…

H: Ergonomics and things?

C: Yeah ergonomics, anthropometrics…

H: Yeah that's something that, particularly in the structure team, they will look at and they'll know from their own experience, and their own databases that they'll draw on for those sorts of things.

C: Would they be online database, or would it be books that they would reference, or is it just again their experience, their intuition.

H: A lot of it will be experience I think, but I'm really not sure where exactly, where they would look for that, I can ask them, I'll find out, there's a couple of guys. (Ask for this)

C: That would be great. Well maybe for the last five minutes or so, is there anything I could maybe tell you, or anything that was missing in the research we delivered to you?

H: Ehh, oh one of the things we were discussing on Friday, was, we know the different types of ways in which glassing occurs, so there's the whole smash and then, which is the very very vindictive one, and then there's the whole a glass thrown against a wall and it's kind of only fall out from that, and then the other is, the one that always shocks me a bit, is probably the most regular one, the one where you completely forget you have a pint in your hand, and you sort of swipe at the side of someones face, as I say it's probably the most common, I don't know.

C: Yeah, I would, well even when you're talking to XXX there's still a bit of ambiguity, people can't exactly pinpoint the most common, but I would definitely say the slapping motion is one of the most frequent. And it's not always intentional, ehh [makes facial gesture of surprise] that does happen - I didn't even realise I had a glass in my hand…

H: I remember that, when I read that bit I was like oh my goodness, we really are dealing with quite a scary situation here aren't we?

C: I went to a bar, we were recording it, and he was telling me everything's fine, in Glasgow, and it was a nice XXX glass, that he was going on about…

H: We design the XXX glass.

C: Ahh. There you go. He really liked it, there was a T on the bottom, you know the little nucleation thing, and it really did get a lively pint, so two managers said to me we like this, really lively, straight glass, simple, I like that. So I asked about any trouble, and he said no trouble really, and he went on this sort of nanny state thing, well if you start taking glass away from us, someone will just hit someone with one of our pool cues or grab a seat and hit them with that. So I turned it off (the audio recorder), and he said "there was a 'glassing', I just didn't want to mention it, and what happened was the guy was out of the game (drunk), we probably shouldn't have even been serving him anymore and he didn't realise he had a glass in his hand and smacked someone." So it does happen. But a girl that we spoke to that it happened to, this slapping motion, so it's often sexual jealousies what have you, in fact two girls, now that I think about it, one an Italian girl, and it happened in Italy, so when people say oh this is a UK thing, well not always, even XXX was like "this doesn't happen in Canada", and I said I have a bit of video footage that I'll have to show you. But yeah so it happens, so the other one was a girl who was outside, it was one of the people we interviewed, so should be included in what you have, and a girl she knew previously and they were just kind of facing off, but the girl I spoke to, she was lovely, you can't imagine anyone having that much venom to do something like that to her, and she said I was just kind of laughing at her aggression when she threatened me, then suddenly I felt what I thought was a punch, so she just saw the hand she had no idea it was a half pint glass in her hand that had hit her, and she said then I just felt the warm liquid pouring down my face and it was at that point I was like 'oh my God.'

H: Yeah, there are few, in terms of reading the research, there are few client briefs that are as shocking as this one, in terms of the emotional and psychological harm of what's being presented as part of the problem, and it really quickens you as to you've got to do something about this as well.

C: Yeah if you can solve it, what is it, about 5000 serious assaults that are reported each year, so I was talking to a few quite tough looking guys, that you'd expect to be completely against it, and the general consensus was "I don't want to get glassed, so if it changes that, go for it, I don't mind too much if my vessel is changed if I don't get glassed, then I'm happy about it."

H: There's that side of it, then the other side of it is, why should my public money be spent on policing time to police this kind of injury and things as well, when it could be spent on much better things.

C: Yeah that's true, it is at a huge cost, and the time.

H: For the NHS that's already under strain, to be dealing with things like this that could be mitigated.

C: I think, your original question, the slapping motion, is probably, as far as I could tell, that was the most common approach next to throwing, and sometimes maliciously throwing, sometimes, a lot of it is a guy in anger throws it against a wall not deliberately aiming it at someone, but some people, I only managed to talk to one actual, what would he be…

H: Perpetrator?

C: Yeah perpetrator lets say, "outside a bar somebody walked by, banged into me, called me something for no reason, I still had my pint, I swore at him, he turned round, and I just threw the glass, and it just hit him, directly." He said "I just wasn't thinking, it was just reaction". So sometimes it's deliberately throwing a glass at the person, as well as those flash point of anger, just throwing a glass and before you know it the shrapnel has hit someone else that you had no malice against.

H: You draw on your personal experience as well, because this project is out there in the public domain as well, it's one of the few you can say to your friends oh we're working on this project at the moment about redesigning the pint glass, and all of them go oh I worked in a bar look at all my injuries, and you get this scene from Jaws where everyone starts showing these injuries, oh look at this one look at this one.

I think I mentioned it to my dad and he said something about, when he was at university or something like that, somebody had dropped a glass quite far away from where he and his group of friends were standing, and then 5, 10 minutes later one of his friends just passed out, and he'd been hit by a tiny shard of glass in a really key artery or vein or something like that, and it was just all spilling out.

C: Nice.

H: And then I was on my way to work and a bus drove over a bottle which exploded, and that was on the road, and I was on the pavement, and I just got showered with glass then. It's the explosive nature of it.

C: And it does just take a tiny little shard, as you say, you can hit somewhere vital, potentially.

H: It's the arbitrary nature of it, which is actually one of its qualities in terms of when it's a whole vessel and looking beautiful and things, actually becomes it's most dangerous component as well.

C: The police that we were talking to, said it's not about glass just being dangerous, it's the potential of glass to be dangerous, to inflict a really serious injury, one analogy that he made, "there was a guy we dealt with recently, and a homeless guy had been annoying him, he said, pestering, pestering and pestering him, and eventually he just turned round and hit him, and he thought fair enough I just hit the guy, he was annoying me I just want him to leave me alone, then he got in a taxi and drove away, but what he didn't realise was the homeless guy had fell over and hit his head on the pavement, and then later died, so someone hitting someone with a glass might not realise the full potential of what they're doing, but the

consequences are what he's judged on. Someone might glass someone and nothing happens, they're completely fine, relatively. But with the exact same motion, exact same motivation, everything, but this just happens to hit an artery or what have you, and they go to jail the other person goes to hospital, misses work, blah blah blah.

H: Yeah it's a knock on effect. Well this is it, when the guys were doing the experiments, the breakage experiments, sometimes they were dropping these glasses, we set up a jig with an arm with various weight on, at different degrees and things, and they were dropping it at about 115 degrees with 5 kilos on this thing, and smashing it against an angle like this, and sometimes it was bouncing off, one of the glasses broke the jig, there was so much strength in this one glass, yet the next glass comes down and explodes immediately, so the variability is massive. Sorry, back to my original question... if there was any sort of data that you know of, that said of the sort of three or four most common ways in which glassing occurs, is there anything that says, we don't think there is any data like this, that says this percentage was the swipe, this percentage was the wall, this percentage was the, sort of Begbie as I would call it, Begbie injury, I think he does it with a bottle, you know the one.

C: Begbie, yeah, I think in that film it was just using the glass, smashing the glass off of someone's face, sort of thing, the premeditated smashing and then going after someone seems quite unusual. I was having a conversation with XXX about it, and he was saying he'd hardly heard of any cases, but when I was doing these interviews back in Glasgow, not that… this is the thing, I got sent back to Glasgow, and people are like oooh Glasgow, but it's not different there, it's the same everywhere.

H: Absolutely. That's the thing. That's why we're wary of stereotyping anyone, particularly as one of the big statistics is all about people you don't even know. And alcohol is so mind-altering for some people as well, and that person that looks really quite normal in any city in any environment could be very different under the influence.

C: I've seen, not related to this project, I just happened to be on Holloway Road and this old guy he must have been 60 odds, walking out of a place mumbling to himself going "you shouldn't have done that, you shouldn't have done that" and then another old man and his friend came out, and he was all covered in blood, so he'd been glassed by this 60 odd year old, this wee old man, you were like, pffft, wow. So it's almost anybody. I did have examples of people smashing glasses beforehand, but there tended to be history there it seemed.

H: And if they don't have that glass, they'll find something else to use as a weapon, is what we determined, if we start to weight the level of safety that some of our concepts bring, if there is one that still allows you to 'tschh', and then do that, that person who uses a glass like that, is going to have a knife, is going be able to use a snooker cue, or whatever.

C: It's like there's premeditation and if there's motivation, if they're looking to inflict maximum damage, they don't need…

H: …that particular glass, they'll find something else, they'll find the potential in anything.

C: Definitely, they'll find something else, they'll smuggle a knife into the pub or club or whatever it might be.

H: So it's almost kind of, when we come to do the weighting in terms of the amount of safety they deliver, maybe we could come and see you again in terms of, because so much of this is becoming a bit subjective about the amount of injuries that occur in a certain way, and we certainly said we want to engage with XXX.

C: Yeah yeah I presume you have his contact details and everything?

H: I'm sure we have, I've been able to get so many contact details from the document.

C: He's a good one, but we asked him quite similar questions, and he wasn't ready to commit to a single answer. The answer is all of these variations can potentially happen…

H: Well I think this is the beauty of having the concepts, is people can critique around something physical, rather than a theory of if it broke like this that and the other, if we could actually show, because we've the different breakage patterns and the different shard types that occur through our crude experiments, which are probably not worth showing yet, but when it comes to the prototypes which will be closer to what it is that we want to achieve, showing that to someone for them to say well that's still breaking in the same kind of shard configuration as a toughened glass, so we're still going to get the same type of lacerations, bad, or eye damage sort of thing, or that does seem to be a more rounded sort of break or something like that, or it's all contained in a little sock.

C: Yeah yeah things like that would be really interesting, and I'd be definitely happy to help in any way I can, XXX would be a good one to get. There was also the guy in Glasgow, XXX.

H: That's really confusing, we have a XXX here, and he's from Glasgow, we'll be questioning him.

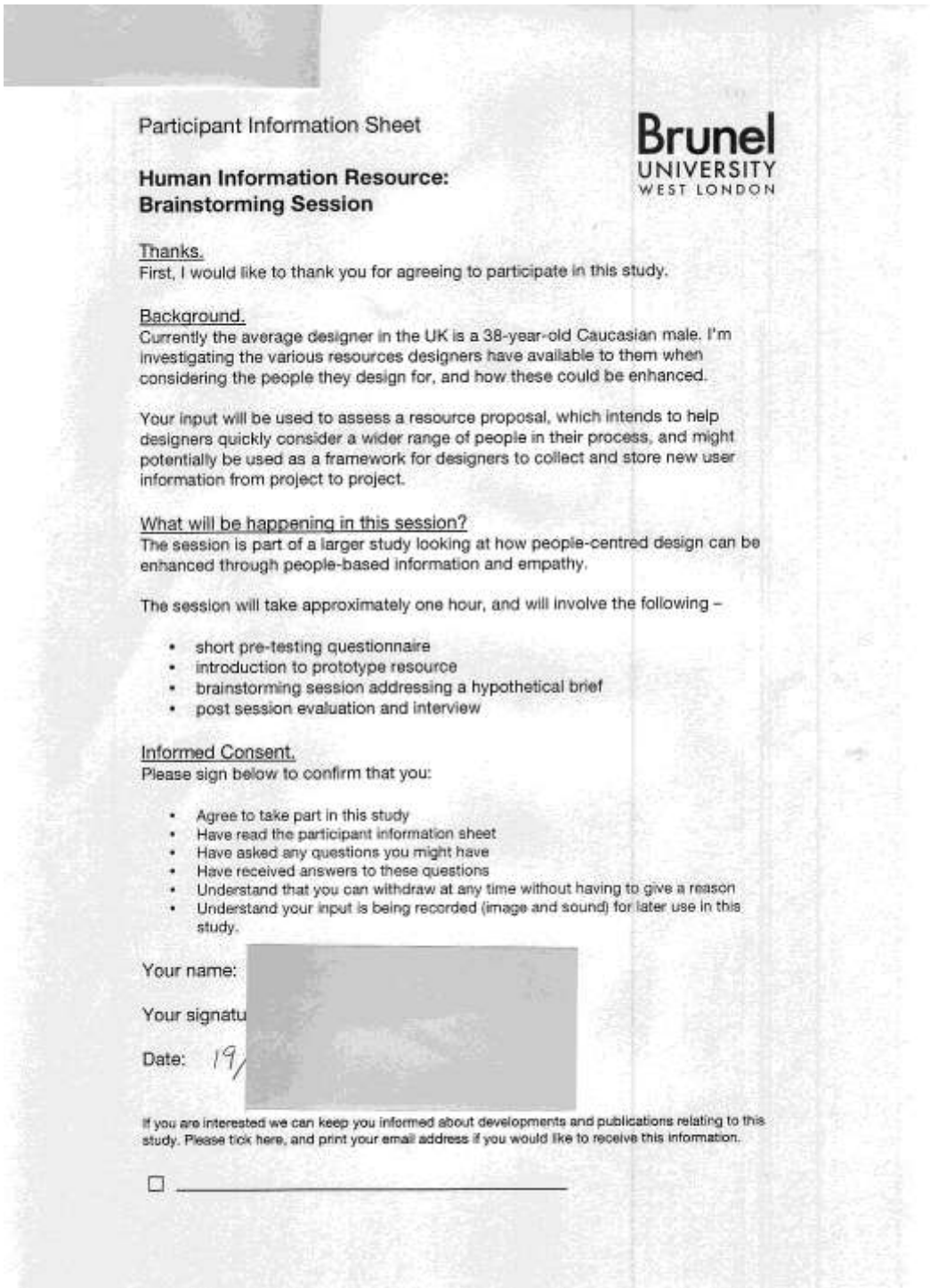
C: (laughs) He was very pro-polycarbonate, but he had lots of good sound-bites, he must have been to a lot of conferences and the likes, but the sentences that he put over were very powerful, things like incidental weapons blah blah blah, increasing potential injury, flashpoints, if it's plastic, he did a study on nightclubs, and he said there was a fight that broke out in one of them, and it was all plastics, so the person that was in the fight was smacking the other one with the plastic bottle, it's just what's at hand, it really is what's at hand he said. He was saying if you go into a club with a load of neds, chavs what have you, but it has bouncers on the door that are well trained, the layout is well thought out, it's plastics that everything is served in, he said that's potentially a million times less dangerous than middle aged middle class pub, where a couple of guys get into an argument about the Rolling Stones, and there's just that moment of red and 'tsch'. I mean from what we uncovered I would think

the slap is definitely one of the most common approaches, and I think XXX would probably agree, but I don't think there's any statistics as such.

H: That's useful to know that, so that we're not missing a trick basically. Or is that another piece of research that needs to be done or something. That's the thing that this could highlight, although there's been a wealth of research that's been done in tabling these new concepts, is there then another round of research that's required before the brands, the brewers and things, feel really confident to commercialise.

(end of interview)

APPENDIX G (Consent form sample) – mentioned in Chapter 7



Participant Information Sheet

Brunel UNIVERSITY WEST LONDON

Human Information Resource: Brainstorming Session

Thanks.
First, I would like to thank you for agreeing to participate in this study.

Background.
Currently the average designer in the UK is a 38-year-old Caucasian male. I'm investigating the various resources designers have available to them when considering the people they design for, and how these could be enhanced.

Your input will be used to assess a resource proposal, which intends to help designers quickly consider a wider range of people in their process, and might potentially be used as a framework for designers to collect and store new user information from project to project.

What will be happening in this session?
The session is part of a larger study looking at how people-centred design can be enhanced through people-based information and empathy.

The session will take approximately one hour, and will involve the following –

- short pre-testing questionnaire
- introduction to prototype resource
- brainstorming session addressing a hypothetical brief
- post session evaluation and interview

Informed Consent.
Please sign below to confirm that you:

- Agree to take part in this study
- Have read the participant information sheet
- Have asked any questions you might have
- Have received answers to these questions
- Understand that you can withdraw at any time without having to give a reason
- Understand your input is being recorded (image and sound) for later use in this study.

Your name:

Your signatu

Date: 19/

If you are interested we can keep you informed about developments and publications relating to this study. Please tick here, and print your email address if you would like to receive this information.

☐ _____

APPENDIX H (Record of navigation steps) – mentioned in Chapter 7

Task analysis

Each participant is given 20 minutes to brainstorm ideas based on the same brief, with the MHIRROR resource available for reference.

Participant 1 - RA (total = 7 sketched concepts, with brief descriptions)

1. Resource begins at 'home' page
2. Navigates to Craig 'Profile'
3. Scans quickly
4. Begins sketching concept
5. Navigates to Craig 'Activity', plays video
6. Watches full video
7. Details first concept
8. Navigates to Craig 'Conversation'
9. Plays "three most important things in my life"
10. Watches full video
11. Navigates to 'Home'
12. Navigates to Susan 'Activity', plays video
13. At approx 53 seconds begins to sketch concept (video continues to play while sketching)
14. Stops sketching watches last few seconds of video
15. Details concept 2
16. Rewinds to approx 103 seconds, video plays from here
17. Watches remainder of video (17 seconds)
18. Navigates 'home'
19. Navigates to Lee 'Activity'
20. Plays for approx 60 seconds
21. Rewinds to approx 40 seconds, video plays from here
22. Watches remainder of video (80 seconds)
23. Begins drawing concept
24. Navigates 'home'
25. Navigates to Bernie 'Activity', plays video
26. Watches full video (120 seconds)
27. Navigates 'home'
28. Navigates to Alison 'Activity', plays video
29. At approx 35 seconds begins concept 4, video continues playing for 12 seconds
30. Pauses video, and finishes sketching up concept
31. Rewinds back to approx 35 seconds
32. Watches clip for approx 20 seconds

33. Details concept, as video plays through
34. Navigates home
35. Navigates to Bernie 'profile'
36. Scans quickly (approx 5 seconds)
37. Navigates to Bernie 'Information'
38. Scans quickly (approx 5 seconds)
39. Navigates to Bernie 'Conversation'
40. Plays "three most important things in my life"
41. Plays "a design that frustrates me"
42. Plays "a design that improves my life"
43. Plays "I would like designers to know"
44. Plays "if a tornado struck, I would save"
45. Navigates back to Bernie 'Information'
46. Scans quickly (approx 5 seconds)
47. Navigates 'home'
48. Navigates to Adam 'environment', doesn't play it
49. Navigates 'home'
50. Navigates to Alison 'conversation'
51. Plays "a design that frustrates me"
52. Plays "a design that improves my life"
53. At approx 24 seconds begins concept, video continues playing
54. Stops few seconds from end of video
55. Plays "I would like designers to know"
56. Navigates to Alison 'environment', scans quickly (approx 10 seconds)
57. Navigates 'home'
58. Navigates to Lee 'Conversation'
59. Plays "three most important things in my life"
60. Plays "a design that frustrates me"
61. Plays "a design that improves my life", stops (at approx 30 seconds)
62. Plays "I would like designers to know"
63. Navigates 'home'
64. Navigates to Adam 'Conversation'
65. Plays "a design that frustrates me"
66. Plays "an object that says something about me"
67. Plays "describing myself"
68. Begins sketching concept (based on 'messy' comment)

Allotted task time finishes

Participant 2 - GF (total = 4 written concepts, notes taken about 5 of the users)

1. Resource begins at 'home' page
2. Navigates to Adam 'profile', reads quickly (approx 10 seconds)
3. Navigates to Adam 'conversation'
4. Plays "describing myself"
5. Plays "an object that says something about me"
6. Plays "a day in my life"
7. Plays "a design that improves my life"
8. Plays again (has difficulty understanding accent)
9. Writes notes (about liking electric toothbrush)
10. Plays "a design that frustrates me"
11. Writes more notes
12. Navigates to Adam 'environment'
13. Writes notes
14. Scrutinises Adam 'environment' page (approx 30 seconds)
15. Writes notes
16. Navigates to Adam 'activity', plays video
17. At approx 30 seconds, starts writing notes
18. Continues listening and occasionally glancing at video, while continually taking notes
19. Rewinds approx halfway, to scrutinise a detail (throwing egg shells in bin)
20. Asks how to navigate 'home'
21. Navigates 'home'
22. Navigates to Alison 'environment', scrutinises (approx 20 seconds)
23. Writes notes
24. Navigates to Alison 'information', reads quickly (approx 10 seconds)
25. Navigates to Alison 'conversation'
26. Plays "an object that says something about me"
27. Watches for approx 20 seconds, then fast forwards to near end, listens briefly, stops video
28. Plays "describing myself", stops after few seconds
29. Plays "3 most important things in my life"
30. Writes notes as it plays, stops it after approx 25 seconds
31. Plays "a day in life"
32. Plays "if a tornado struck, I would save"
33. Writes notes (about inhaler comment)
34. Navigates to Alison 'information', scans quickly (approx 5 seconds)
35. Navigates to Alison 'environment', looks quickly (approx 10 seconds)
36. Writes notes
37. Navigates to Alison 'activity', plays video
38. Watches for approx 20 seconds, writes quick note
39. Continues watching until approx 90 seconds in, writes notes until video finishes

40. Navigates 'home'
41. Navigates to Bernie 'profile', reads quickly (approx 10 seconds)
42. Writes notes
43. Navigates to Bernie 'information', scans quickly (approx 5 seconds)
44. Navigates to Bernie 'conversation'
45. Plays "a design that frustrates me"
46. Plays "I would like designers to know"
47. Writes notes
48. Navigates 'home'
49. Navigates to Bernie 'activity', plays video
50. Takes notes as video plays, for approx 30 seconds
51. Stops taking notes, watches for about 10 seconds, fast forwards to near end, plays
52. Asks "how much time is left", (about 3 minutes)
53. Stops video
54. Navigates to Craig 'activity', plays video
55. Randomly skips through it, listening in several places
56. Writes notes
57. Navigates to Craig 'information', scans quickly (approx 5 seconds)
58. Navigates to Craig 'profile', scans quickly (approx 5 seconds)
59. Writes notes
60. Navigates 'home'
61. Navigates to Lee 'profile', reads quickly (approx 10 seconds)
62. Navigates to Lee 'environment', reads quickly (approx 10 seconds)
63. Navigates 'home'
64. Navigates to Susan 'profile', scans quickly (approx 5 seconds)
65. Navigates to Susan 'environment', looks quickly (approx 10 seconds)
66. Writes notes

Allotted task time finishes

Participant 3 – MK (total = 4 concepts, with written explanations)

1. Resource begins at 'home' page
2. Navigates to Craig 'information', reads quickly (approx 10 seconds)
3. Navigates to Craig 'environment', looks quickly (approx 10 seconds)
4. Navigates to Craig 'activity', fast forwards through listening briefly at several points
5. Navigates home
6. Navigates to Bernie 'activity', fast forwards through listening briefly at several points

7. Navigates ‘home’
8. Navigates to Susan ‘activity’, fast forwards through listening briefly at several points
9. Gets paper, and starts talking about an existing design “I’m thinking about someone else’s idea, Guy Robinson’s idea that uses plastic bags.”
10. Stops video
11. Stops referring to resource at this point, draws up 2 concepts and writes notes for approximately 4 minutes
12. Returns to resource,
13. Navigates to Lee ‘environment’
14. Says “it doesn't mention who she lives with does it?”
15. Navigates to Lee ‘conversation’
16. Plays “a design that improves my life”, fast forwards after 10 seconds, listens near end
17. Plays “describing myself”, fast forwards after 10 seconds, listens near end
18. Plays “I would like designers to know”
19. Sketches idea, says “this gives me an idea”
20. Looks at titles of remaining clips for short time (approx 10 seconds)
21. Plays “a day in the life”, participant says “day in the life is useful”
22. Navigates ‘home’
23. Navigates to Bernie ‘conversation’, just looks at video titles
24. Navigates to Susan ‘conversation’
25. Plays “I would like designers to know”, skips through randomly
26. Navigates ‘home’
27. Navigates to Bernie ‘environment’, looks quickly (approx 10 seconds)
28. Navigates ‘home’
29. Navigates to Adam ‘conversation’
30. Plays “I would like designer to know”, user can't think of answer
31. Participant says “that’s a difficult question to ask normal people”
32. Starts talking about ‘air B&B’ web-based service and possible idea for similar website
33. Stops using resource for approximately 3 minutes, while sketching idea
34. Navigates ‘home’
35. Navigates to Adam ‘environment’, looks at briefly (approx 15 seconds)
36. Says “I would like more images of their kitchens”
37. Navigates ‘home’
38. Navigates to Alison ‘environment’, scans quickly (approx 5 seconds)
39. Navigates ‘home’

40. Navigates to Craig 'environment', looks at images for approx 20 seconds
41. Navigates 'home'
42. Navigates to Susan 'environment', looks at images for approx 20 seconds
43. Sketches idea

Allotted task time finishes

Participant 4 – EM (total = 4 written concepts, written thought process/mind-map)

1. Resource begins at 'home' page
2. Navigates to Adam 'information' (looks at for approx 20 seconds)
3. Navigates to Adam 'profile' (looks at for approx 20 seconds)
4. Navigates to Adam 'activity', plays video through
5. Watches entire video
6. Writes first notes
7. Navigates to Adam 'conversation'
8. Plays "Describing myself"
9. Plays "A day in my life"
10. Plays "A design that frustrates me"
11. Plays "An object that says something about me"
12. Plays "I would like designers to know"
13. Navigates 'home'
14. Navigates to Alison 'profile' (looks at for approx 20 seconds)
15. Navigates to Alison 'information' (looks at for approx 20 seconds)
16. Navigates to Alison 'activity', plays video through
17. Says "I think for this brief, I'll get the most out of watching their activities"
18. Adds more notes
19. Navigates 'home'
20. Navigates to Bernie 'profile'
21. Navigates to Bernie 'environment'
22. Adds more notes
23. With approximately 10 minutes remaining says "right, better get down to putting down some ideas"
24. Spends approx 5 minutes writing (mind-map style).
25. Makes no more references to MHIRROR
26. Goes back over notes draws out more branches
27. Scribbles additional notes under each of his ideas

Allotted task time finishes

Participant 5 – JW (total = 6 written concepts with notes, written initial themes)

1. Starts on paper immediately, writing quick notes
2. Resource begins at 'home' page
3. Navigates to Adam 'profile'
4. Navigates to Adam 'conversation'
5. Plays "a design that improves my life"
6. Plays "I would like designer to know"
7. Plays "if a tornado struck, I would save"
8. Plays "A day in my life"
9. Navigates to Adam 'activity'
10. Writes note at approx 15 seconds, and leaves video playing
11. Writes separate note
12. Writes separate note
13. Writes separate note
14. Navigates 'home'
15. Navigates to Alison 'activity', scans quickly (approx 5 seconds)
16. Navigates to Alison 'profile', looks quickly (approx 10 seconds)
17. Navigates to Alison 'information', looks quickly (approx 10 seconds)
18. Navigates to Alison 'environment', looks quickly (approx 10 seconds)
19. Navigates to Alison 'activity'
20. Writes note
21. Plays Alison activity
22. Approximately 100 seconds in, writes notes
23. Watches remainder of video
24. Navigates 'home'
25. Navigates to Craig 'activity'
26. Writes notes
27. Stops video approximately 40 seconds in, writes notes for approximately 2 minutes
28. Plays video for approximately 50 seconds, writes notes whilst video finishes
29. Navigates to Craig 'profile', scans quickly (approx 5 seconds)
30. Navigates to Craig 'environment' (looks at for approx 20 seconds)
31. Writes notes for approximately a minute
32. Navigate to Craig 'profile', scans quickly (approx 2 seconds)
33. Writes quick note
34. Navigates 'home'
35. Navigates to Lee 'conversation'
36. Writes notes
37. Plays "a design that improves my life"
38. Rewinds, listens again
39. Writes notes

40. Navigates 'home'
41. Navigates to Bernie 'conversation'
42. Plays "3 most important things in my life"
43. Plays "a design that frustrates me"
44. Plays "I would like designers to know"
45. Navigates to Bernie 'activity', plays video
46. Leaves playing while going back to earlier notes, adds to notes
47. Watches video for few seconds
48. Writes more notes

Allotted task time finishes

Participant 6 – PZ (total = 4 fully sketched concepts in environment, with brief descriptions)

1. Starts sketching concept immediately (approximately 1 minute)
2. Resource begins at 'home' page
3. Navigates to Bernie 'profile' (looks at for approx 10 seconds)
4. Details concept
5. Reads Bernie 'profile' again
6. Navigates to Bernie 'information' (looks at for approx 10 seconds)
7. Navigates to Bernie conversation
8. Plays "I would like designers to know"
9. Starts sketching new concept
10. Plays "describing myself"
11. Listens while continuing to sketch up idea
12. Continues to sketch idea for approximately 3 minutes
13. Plays "an object that says something about me"
14. Plays "3 most important things in my life"
15. Plays "I would like designers to know", stops few seconds in
16. Navigates 'home'
17. Navigates to Alison 'conversation'
18. Plays "3 important things in my life"
19. Plays "I would like designers to know"
20. Navigates to Alison 'profile' (looks at for approx 20 seconds)
21. Navigates to Alison 'information' (looks at for approx 10 seconds)
22. Navigates to Alison 'environment' (looks at for approx 20 seconds)
23. Navigates to Alison 'activity', plays video
24. Watches video through
25. Starts sketching
26. Annotates sketches for approximately 2 minutes
27. Navigates 'home'
28. Navigates to Lee 'conversation'
29. Plays "a day in my life"

30. Rewinds, plays again
31. Starts sketching while listening to remainder of video

Allotted task time finishes

APPENDIX I (Microsoft desirability cards) – mentioned in Chapter 7

Source: Benedek, J. and Miner, T. (2002). Measuring Desirability: New Methods for Evaluating Desirability in a Usability Lab Setting. In: *UPA 2002 Conference*. Orlando, FL.

APPENDIX J (Dissemination) – mentioned in Chapter 8

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