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A Critical Artefact Methodology:
Using Provocative Conceptual Designs to Foster Human-centred Innovation

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Abstract

This research develops a rationale for using provocative conceptual designs to foster the innovation of human-centred product ideas – a 'critical artefact methodology'.

This research employed similar tactics to Action Research (Swann 2002): cycles of action (using critical artefact methods in design projects) and reflection on that action (including a contextual review of existing theories and practices), which produced action (product ideas) as well as research (a proposed critical artefact methodology).

In two projects, I used sets of workshops where stakeholders' engaged with my critical artefacts to develop my understanding of their needs. *Living Rooms* (designing the home for 'tomorrow's older people') suggested how my methods might be improved then taken account of in *Digital Mementos* (designing novel mementos for increasingly digital lifestyles), including selecting productive participants – stakeholders in-tune with the possibilities of novel situations, such as von Hippel's "lead users" (1986).

Within participatory design and co-design I position critical artefact methods as using stakeholder participation to *inform* design activity rather than as co-creation. In reference to Ehn & Kyng's mock-ups (1991) and Gaver's cultural probes (1999) exemplars, I show that critical artefacts do not fit the description of 'prototypes' (suggestive of design direction or destination) and that my critical artefact methodology depends upon a progression from presenting stakeholders with critical artefacts (that provoke critical reflection) towards more 'prototypical' artefacts expressing relevant needs (for evaluation).

I suggest that critical design (Dunne 1999) and related design practices have similar characteristics and operation to Critical Theory: a view that the status quo (generally affirmed by design) somehow 'oppresses' society; that 'enlightenment' of the factors underlying this 'emancipates' society and is facilitated by a *reading* of critiques (alternative proposals such as critical artefacts).

In my critical artefact methodology the designer develops their understanding by designing artefacts to 'process' stakeholders' engagement with previous artefacts – I use Polanyi's notion of "indwelling" (1966) to support this method of empathic knowledge sharing. Designer's and stakeholders' *co-reading* of critical artefacts means that this understanding can be of future or latent stakeholders needs; it enables them to explore alternative needs, wants/desires, practices and products by broadening their understanding of what is possible.

The contributions of this research are a critical artefact methodology supported by critical artefact methods; a more instrumental use of critical artefacts than other critical design practices; and (in *Digital Mementos'* outputs) exemplar findings demonstrating the value of a critical artefact methodology's application. Whilst this thesis presents a 'point in time' in my methodology's development, I intend that it provide designers with insights into similar techniques within their own professional practice.

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On a personal note, this thesis is the culmination of several challenging years following my decision to leave a well paid job in 2002 to pursue a more fulfilling career in Design. I would not have reached this point without the constant support, belief and love of my parents and my wife, Joanna. This thesis is dedicated to them.

1 Setting the scene

1.1 Introduction

"If I'd asked people what they wanted, they would have asked for a better horse."

The above quotation is often attributed to Henry Ford. Apocryphal or not, the pioneering car manufacturer's comment rings true. His customers didn't know the potential of motorised road transport, so couldn't say what they wanted from it. The design of any radical, new product poses a similar problem: how can its designers understand what people want if those people don't know what they can have?

In 2003/2004 I completed an MA in Industrial Design consisting of a single major design project. During this design project I encountered a significant problem, a 'sticking point' that hindered progress: the users I worked with could only ask for 'better horses'. I discovered that I could stimulate users' exploration of novel products by showing them provocative design concepts – to continue the analogy, I could get them to explore what 'motor cars' might be. This tactic had similarities with work by Gaver & Martin (2000) who produced a set of provocative conceptual designs to stimulate a discussion of the potential of information appliances amongst their design collaborators. The results of the MA project suggested to me that the tactics I had adopted might form the basis of methods for more general use by designers.

The MA project therefore provided the impetus for the PhD research – it suggested a principle as the basis of a new design methodology. But it also outlined a basic 'starting point' implementation of this principle. Hence the MA project work is effectively preliminary project work for the PhD research[1]. This preliminary work and how it shaped the PhD research are discussed

[1] At an early stage of the PhD research, I reported on my MA work in a co-authored paper (Chamberlain & Bowen 2006) given at the Cambridge Workshop on Universal Access and Assistive Technology (CWUAAT).

below, including: how the research relates to Anthony Dunne's notion of "critical design" (1999), the value of scenarios in engaging people with design ideas, and the resulting practical methods as a form of human-centred design. However I will end this introduction by positioning my personal interest in design and discussing the challenge of designing innovative products that 'work' in the 'real world'.

1.1.1 My route to design research

My early career was driven by an interest in new technology. Following a higher national diploma in audio and video systems and an undergraduate degree in electronic engineering, I worked as a technician and later manager of media production facilities: sound recording and video editing suites; a multi-camera television studio and control gallery; and photographic darkrooms for chemical developing and printing. This work involved the installation, configuration and operation of technology for creative ends – making music, and still and moving images. It also broadened my interest into 'new media' (as it was then called) – interactive multimedia and the World Wide Web – and I designed and built several web sites and CD-ROMs. This led to me specialising in web technology for the four years prior to my MA, including three years managing the large team of developers who built and maintained web sites for Freeserve.com plc the, then, UK's largest Internet Service Provider.

As a middle manager, my responsibilities began moving away from the design and implementation of new technology and media towards business and operations management – I was managing those doing the 'interesting work' rather than doing it myself. I undertook the MA to re-engage my interests, intending to become a designer of new technology products and systems rather than a user or manager of them.

My previous work has informed my study of Design and development as a designer. In my experience, media technology design and innovation followed a 'technology-led' approach illustrated by questions such as "how can we do something different with the 'kit' that we have?" and "what can we use this new device/software for?" As a designer and then manager of web projects, design briefs were primarily driven by business requirements such as increasing

web site visitors, online sales and advertising revenue. I was experienced in designing solutions that balanced business goals with technical feasibility and in devising and managing working processes to enable technical, creative and business teams to work together to produce them, but the missing link was considering the needs of users. As will be discussed in the remainder of this thesis, my MA, and the PhD research that followed it, both filled this gap and challenged my prior conceptions, enabling me to develop a more human-centred view of innovation.

1.1.2 Technology, innovation & people

New technologies and technological products are frequently developed that appear to have potential: they might offer novel or 'improved' functions or fill a niche identified by market research. But it is difficult to determine how a new product or system will perform once it is made available in the 'real world' – is it needed, does it 'work', and will it sell? A challenge for innovators is to develop products that will succeed rather than fail in the 'real world'.

The 'technological determinism' view of technological change proposes that technology develops independently from the society it impacts upon – technology 'advances' (according to, say, economic or logical drivers) and changes the lives of the people who use it (Williams & Edge 1996)[2]. However certain studies of technology show that society and technological change are interrelated, affecting each other in a more complex and subtle manner; in particular, accounts of the "social construction of technology" (Pinch & Bijker 1984).

The social construction of technology (SCOT) is generally traced to the work of Pinch & Bijker (1984) who extended thinking from the sociology of scientific knowledge (SSK) to propose a framework for studying technological change. The SCOT approach has informed numerous subsequent studies whilst generating some debate as to its completeness (Klein & Kleinman 2002) and its relationship to other theories of the "social shaping of technology"

[2] I often saw this view implicitly accepted by colleagues in the media technology industries.

(Williams & Edge 1996), but its general principles provide a useful way of thinking about technology and innovation.

SCOT accounts illustrate how technological products do not develop in a simple linear manner (one 'advancement' leading to the next); rather they emerge from an interconnected web of numerous possibilities, each of which is socially determined: "[..] technology design is an open process that can produce different outcomes depending on the social circumstances of development" (Klein & Kleinman 2002, p29). These possibilities can be conceptualised as 'interpretive flexibility' (as it is termed in SCOT), the concept that the social groups who encounter a technology (for example 'users') bring different understandings, such as: which problems are perceived as relevant (and, therefore, where innovation is required); how a technology is comprehended and appropriated; how a solution is recognised (or the problem is redefined); and how a technology might affect society. According to SCOT, it is these social groups that ultimately determine how and if a technology develops – the technology is socially constructed. In short, society determines whether a technology 'works' not its intrinsic quality (cf descriptions in Atkinson 2008, Klein & Kleinman 2002, Pinch & Bijker 1984, Williams & Edge 1996).

SCOT is then also a methodology for studying the development of technological products. Researchers can "[seek] to identify instances where technologies could be designed in more than one way, with choices between different technical options, and to explain why one way of designing the artefact triumphed" (Klein & Kleinman 2002, p869-870). SCOT provides a framework for constructing these explanations.

For example Pinch & Bijker (1984) question the development of the modern bicycle as a linear series of technological advances from the 'penny farthing'. In the 1880s, far from being seen as 'primitive' the 'penny farthing' was valued by adventurous young men for its speed over other types of bicycle. However this was only one amongst several social groups with differing understandings of their own needs and the technology's possibilities, for instance 19th century female cyclists sought smaller wheeled bicycles that could be ridden in skirts. Pinch & Bijker show how the familiar bicycle we recognise today (with air tyres and chain driven rear wheel) developed from a

web of possible problems and solutions constructed and re-constructed by the social groups involved, such as 'sports' cyclists re-definition of pneumatic tyres' function as being greater speed rather than greater comfort (as they were originally considered).

Atkinson (2008) provides an example of a product 'failure' in the form of the tablet computer (a portable computer with pen-type interface). His account concludes that, although its technical problems have been overcome, the product is still largely unsuccessful because for most people, the tablet computer does not 'work' – their idea of what 'works' being socially constructed (for example people may not be comfortable 'writing' on computer screens).

Accounts of the social construction of technology illustrate how people affect technology and innovation. My research is concerned with innovation and therefore needs to attend how social forces shape technology and technological products, in particular the idea that, often, society directs technological development rather than technology directing society[3]. As a methodology, SCOT provides a way of understanding these relationships by studying previous technological change. However my research is concerned with the innovation of new (technological) products whose success or failure, and the social circumstances affecting it, has yet to be played out. So, in attempting to develop innovative products for the 'real world', my design methods should recognise the need to understand technology within its social context and attend to that social context to explore which problems to address and solutions to offer. The principles of human-centred design (discussed below in 1.7, p26) may enable me to understand the social constructions of what is 'needed' and what should 'work', but the ultimate test of product success or failure (such as, would it sell) will remain until they are released into the 'real world'.

[3] This view is echoed in von Hippel's observations that the 'lead users' of technological products often drive innovation rather than their manufacturers, discussed later (5.4, p141).

1.2 Preliminary work - a sticking point

My MA project aimed to develop novel product ideas for the display, storage and organisation of digital photographs (in particular personal and family photograph collections): product ideas that utilised the numerous possibilities of digital technology – interconnected networks of devices, emerging technologies such as electronic ink[4] and alternative computing paradigms such as ubiquitous computing[5]; product ideas that were not limited to established paradigms of paper prints or a computer monitor as represented by the introduction of electronic photograph frames (Philips 2006); but crucially product ideas that were user-centred, being based on an understanding of their likely users' needs.

To develop this understanding of user needs I identified and recruited a set of users and conducted a series of activities with them. I defined 'users' of personal photograph collections as those likely to have generated a large number of personal and 'family' photographs and consequently wanting to organise, store and display them. Two groups of such users were selected: families with young children and older people. Four women from families with young children and four older people participated in the activities.

My first activity with the individual participants was a semi-structured informal interview. Participants were asked to bring along a sample of their personal photographs in the manner they were stored, whether that be in an album, the packets the prints were delivered in or an old shoebox (for example). Participants were then asked open-ended questions intended to explore their current practices and needs for photograph collections. This activity provided some understanding of user needs and practices in the existing situation but did not provide any understanding of what these needs might be for the novel situations that novel products and systems could afford.

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[4] Electronic ink technology allows the creation of 'paper-like' displays, where text and images can be dynamically changed using electric charging and discharging of ink particles, and is applied in products such as electronic books (E-Ink Corporation, Philips and Sony 2004).

[5] Ubiquitous computing refers to an alternative paradigm of computing first posited by Mark Weiser of the Xerox Paulo Alto Research Centre (1991) – a ubiquitous multitude of specialised devices so that tasks are accomplished by using several, simple-purpose devices rather than the prevalent paradigm of accomplishing tasks using one, multi-purpose device (the personal computer).

The second activity was intended to explore user needs that may not be immediately obvious; in particular user needs that novel products might address. Participants were asked to use low fidelity prototyping materials[6] (such as cardboard frames, paper, sticky labels, assorted blue foam shapes – see Figure 1.1) to explore how new digital photograph products and systems might function. To stimulate participants' development of ideas they were asked to imagine metaphors that expressed conceptual ideas about technical possibilities – 'magic paper' on which images could change and 'photos like radio' that could be transmitted and received wirelessly. Participants were also given four social scenarios in which the product ideas they had developed might be used. The sessions were video recorded.

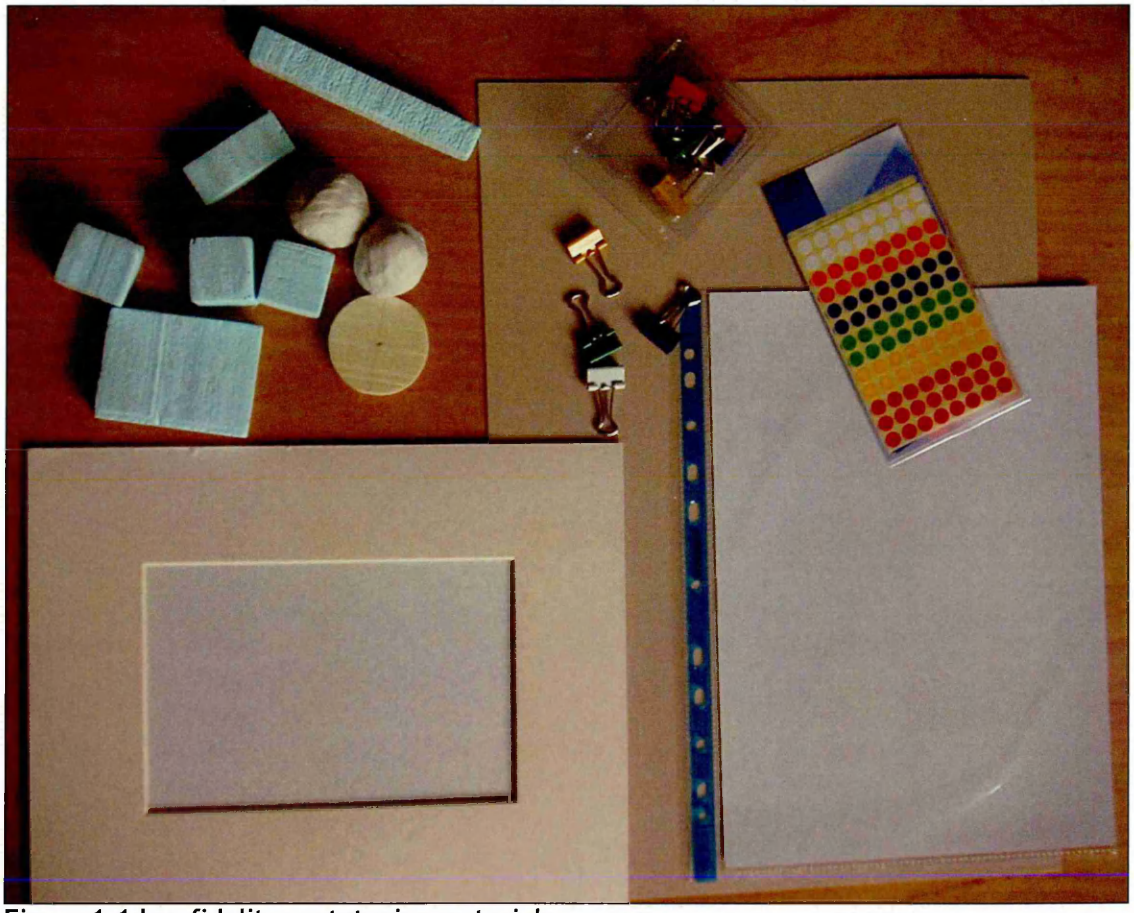

Figure 1.1 low fidelity prototyping materials

[6] The concept of low fidelity prototypes goes back to Ehn & Kyng's notion of the "cardboard computer" (1991). However the sense in which low fidelity materials are used here (and is often seen in other work) does not utilise some of the key principles Ehn & Kyng discuss with their notion of "mock-ups" (ibid.). These principles are discussed further in 3.5.1 (p60).

The low fidelity prototyping activity did not prove particularly effective in supporting the aim of developing user-centred new product ideas. Participants' responses and the product concepts they developed were greatly influenced by their existing experiences. Participants tended to recreate what they already knew. For example one participant described selecting images from a displayed list by "tapping" on them, relating to her experiences of using web browsers, another participant described a 'traditional' album with a keypad mounted on the front to select the dates of the photographs within. So this activity was not effective as a way for the participants' to 'co-design'[7] with me a set of novel product ideas (in the paradigm-questioning sense described above). And consequently the activity was not effective at exploring the novel situations such products would create and understand the user needs associated with them.

The methodological question then became how to explore such novel situations. What activities could enable participants to engage with novel situations that were outside their familiar experiences?

1.3 Preliminary work - a way forward?

A project described by Bill Gaver and Heather Martin (2000) suggested some tactics I might use to enable my participants to engage with novel situations.

Gaver and Martin, from the Computer Related Design department at the Royal College of Art, participated in the Information Appliance Studio a collaboration which also included Hewlett-Packard and the design consultancy IDEO; the aim of this organisation being "to explore and shape new possibilities for everyday technologies" (ibid., p209). In particular the organisation wanted to explore the idea of "information appliances" a term coined by Donald Norman (1999) referring to digital devices with a single function (or simple set of functions) and Norman's future vision of computing – closely related to Weiser's vision of ubiquitous computing (1991) – of numerous specialised, simple information appliances rather than fewer multi-purpose, complex computing devices (as is generally the case now). The notion

[7] The meaning of 'co-design' and its relationship to a critical artefact methodology are discussed in 3.3 (p55).

of information appliances was, and arguably still is, novel with few concrete examples, and the group wanted to understand the possibilities for such devices.

Gaver and Martin produced a workbook of twenty "conceptual design proposals" which they presented to their collaborators for inspiration. These conceptual design proposals suggested alternative values that might be embodied in everyday technologies, values which were not usually seen in existing products. For example *Dawn Chorus* (Figure 1.2) suggests a bird feeder that teaches your local songbirds to sing your favourite tunes using behaviourist principles – rewarding mimicry with more birdseed.

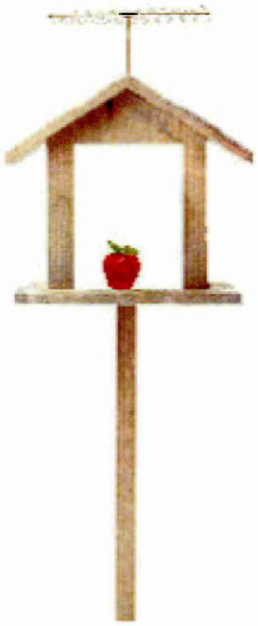

Figure 1.2 Dawn Chorus
(image courtesy of and copyright © 2000 W.Gaver & H.Martin)

Gaver & Martin did not intend their workbook to be a set of practical proposals for future products, rather to open up a conversation amongst their collaborators as to what values information appliances might embody. Recognising that the future is difficult to envision, the workbook offers some starting points for discussion to "encourage people to imagine living with them, raising many of the sorts of reactions that might be encountered if they actually existed" (2000, p215). They describe the conceptual designs as "*placeholders,* occupying points in the design space without necessarily being the best devices to populate it" (ibid., p216, their *emphasis*). So the conceptual

designs provided starting points for exploring these design spaces, defining the contexts for new digital devices.

In concluding Gaver & Martin suggest conceptual design proposals "might also form the basis for new kinds of user studies [..] concept proposals could introduce speculative new ideas to potential users in such a way as to evoke general insights into their attitudes as well as more specific reactions" (ibid., p216). So, would conceptual design proposals offer a way forward in the MA project work? Would conceptual design proposals enable my participants to engage with novel situations in a way that usefully informed my understanding?

1.4 Conceptual design workshops

I devised a set of six conceptual designs that were then presented to six of the participants from the earlier activities in two groups of three – two older people and one 'families with young children' representative. The conceptual designs were presented via scenarios told using 'photo essays' – series of staged photographs of the conceptual designs in context 'telling a story' about their use. In workshops, participants were invited to discuss the conceptual designs, which were presented as valid design proposals. Again the sessions were video recorded.

For example the *Forget Me Not Frame* (Figure 1.3) is a provocative conceptual design devised to explore issues of social etiquette and dynamic display of photographs. The frame has a lever on its side that fades out the photograph, the lever also slowly descends over time and needs continually pulling up to prevent the photograph disappearing. The frame also communicates with other digital photograph devices. For example in the photo essay: my mother is on the phone to me; we have an argument and she slams the phone down; then walks over to the *Forget Me Not Frame* and pushes the lever down; this 'disappears' the picture in the frame; but also any other photos of me displayed elsewhere.

Figure 1.3 ***Forget Me Not Frame***

These conceptual design scenarios prompted illuminating discussions from the participants. Reviewing the video recordings of the workshops suggested insights that informed my development of further conceptual designs. It appeared that, although participants could not imagine wanting the products, they did engage with the ideas and concepts expressed through them. For example the *Forget Me Not Frame* prompted the comment that "the whole concept of wiping someone out [is] horrible", but participants went on to discuss the effects of changing family relationships and how being able to 'edit out' particular photographs could be beneficial – i.e. with an increasing number of relationships ending in separation and divorce, it could be socially tactful to remove certain photographs on display during family visits.

My reflection on the workshop discussions informed the ongoing design exercise, creating a richer understanding of users' needs relating to these novel situations. This was expressed as 'way marker' design concepts (as I termed them) that indicated possible directions for further design work; concepts that expressed themes to be considered in the design of digital photograph products. An example theme was that the emotional connection people have

with personal photographs means that their use and display should be 'open-ended' – people dislike such emotive material being automated or controlled.

In the low fidelity prototyping sessions (discussed in 1.2, p16) participants were asked, in part, to shape the proposed design (using the low fidelity materials), so the intellectual property of any resulting designs should be shared between users and designer. However in the conceptual design workshops, participants were asked to offer opinions on the proposed designs that then informed my (the designer's) understanding of their needs. The intellectual property issues are therefore less complex as the participants do not see themselves as 'designing'[8].

So, this strategy of using conceptual design proposals in discussion workshops with users appeared to have some merit in the context of my MA project work. It appeared useful in enabling users to engage with the particular novel situations and enabled me (as a designer) to develop an understanding of users' needs in those situations. This provided the impetus for my PhD research where I aimed to find out how far such ideas might be generalised.

1.5 Critical design

The conceptual designs that Gaver & Martin presented to their partners were about more than suggesting novel applications of technology; they describe them as suggesting different values for domestic technology (2000). They suggest their concepts offer alternatives to two standard cases: 'work' values being translated to the home (devices for doing/managing tasks); and the value of leisure time (devices for entertainment, play and relaxation). For example the *Dawn Chorus* bird feeder (Figure 1.2) explores our desire to control and personalise our environment (the birdsong we hear), even if this is at the expense of manipulating songbirds' natural behaviour.

The discord between values associated with influence and respect for the 'natural world' apparent in *Dawn Chorus* is important. It makes the concept provocative and encourages its viewers to reflect on the values inherent in it.

[8] In chapter 3 I will discuss how users can participate in and inform designing, how artefacts can be used within such participation, and how my use of conceptual design workshops within this scheme is *not* a form of co-creation.

Gaver & Martin describe concepts such as this using Anthony Dunne's term "value fictions" (Dunne 1999) – in this view, whereas science fictions describe recognisable social activities accomplished via implausible technologies, value fictions describe recognisable technologies used to accomplish implausible social activities. Gaver & Martin and Dunne see such value fictions as being useful critiques of society and technology.

The idea of designing artefacts (such as Gaver & Martin's conceptual design proposals) as a form of critique is developed much further in Dunne's notion of "critical design" (ibid., Dunne & Raby 2001). I will discuss critical design at greater length in chapter 4, but a short summary of the key ideas and their relationship to the preliminary work is helpful at this point.

In *Hertzian Tales* (1999) Dunne criticises the manner in which electronic products are generally designed, arguing that they embody the ideologies that created them (they reflect the values of their designers and manufacturers) and that the nature of these ideologies makes it undesirable for products' users to accept them unthinkingly. For example, he suggests that design generally serves a culture of consumption, and that unthinking acceptance of this ideology of consumerism leads to industrial design maintaining a society of passive consumers (ibid.). In *Design Noir* (2001) Dunne & Raby develop this idea further, categorising an ideological nature of design as either affirmative or critical. Affirmative design leaves the embodied ideologies unchallenged by producing products that conform to cultural, social and technical expectation. Critical design critiques such ideologies by producing products that embody alternative values and ideologies.

For example, the conceptual designs from the project *Designs for Fragile Personalities in Anxious Times* aim to generate debate about "increasingly irrational contemporary anxieties and fears" (Z33 2007a). For example *Huggable Atomic Mushrooms* (Figure 1.4) are soft toys that allow people who are afraid of atomic annihilation to treat their phobia via gradual exposure to a representation of their feared object.

Figure 1.4 Huggable Atomic Mushroom (2004-5, with Michael Anastassiades)
(image courtesy of Dunne & Raby, photo: © Francis Ware 2007)

Dunne describes critical design as being related to critical theories, quoting (but not elaborating on) this passage from Raymond Geuss[9]:

> *"Critical theories aim at emancipation and enlightenment, at making agents aware of hidden coercion, thereby freeing them from that coercion and putting them in a position to determine where their true interests lie." (1981, p55)*

Geuss is discussing ideas stemming from the work of the Frankfurt School of social theorists. Craig Calhoun summarises their work as:

> *"[the Frankfurt School] wanted to distinguish Critical Theory from the sort of 'traditional theory' that accepted the self-definition of the familiar and failed to look more deeply at how the categories of our consciousness were shaped and how they in turn constituted both the world we saw and what we took to be possible." (1995, p14)*

So, perhaps Dunne is suggesting that critical design enlightens us of the ideologies embodied in 'affirmitively designed' products and, as a result,

[9] I will review Geuss' discussion in 4.3.3 (p106).

emancipates us from them. But how does this enlightenment occur and in whom? For Dunne (and Gaver & Martin), critically designed artefacts prompt viewers to reflect on alternative values and, consequently, the values in existing products. Such 'critical artefacts' (as I will call them) prompt reflection in their audiences. This reflection is critical in the sense that an alternative position is provided for the audience to balance their own values against. 'Critical reflection' could be the basis of the enlightenment to which Geuss refers.

The emancipation aspect of critical design is less clear. In critical design (and practices closely related to it) the critical reflection is often the 'end product' of the design activity. Gaver & Martin (2000) used this critical reflection in a more instrumental way – to elicit "a conversation [with our collaborators] about the directions we might take in pursuing information appliances" (p215). However I have not discovered any subsequent publication discussing what direction this was, what information appliances were developed and how they related to the discussions prompted by the conceptual design proposals.

The use of conceptual designs in my preliminary work demonstrated an instrumental use of critical reflection to develop an understanding of user needs. Gaver & Martin used critical reflection to *define* the problem context; in my MA project I used critical reflection to *investigate* a particular problem context. This suggested an opportunity to develop generalisable practical methods exploiting this tactic and a methodology to support them – what I shall call 'critical artefact methods' and a 'critical artefact methodology'[10]; to develop an instrumental use of critical reflection (as prompted by purposefully designed critical artefacts) as a way of understanding stakeholder needs[11].

1.6 Scenarios

In the preliminary work I did not present the critical artefacts to the user groups in isolation. They were contextualised via 'photo essays' describing a possible usage scenario for each artefact. This tactic appeared to be beneficial –

[10] These are my own terms, albeit related to the wider concept of critical design, and I am not aware of them being used by others elsewhere.
[11] 'Stakeholder' is a more appropriate term than 'user' in a human-centred design approach, as I will discuss in 1.7 (p26) below.

users commented on the broader implications of the scenarios rather than mundane aspects of the artefacts (such as "wiping someone out [is] horrible" rather than "why is the lever blue?"). There is precedent in others' work to support the use of scenarios.

Cockerille (2004) shows how design students used scenarios, rather than artefacts alone, as a compelling way of communicating their ideas about future interactive technologies to their industrial collaborator. Saks-Cohen (1997) describes how young designers used scenarios to design for older people– writing and elaborating stories about what it is like to be an older person to deepen their understanding of their needs and aspirations. And Blythe (2004) discusses using "pastiche scenarios" (stories describing familiar literary characters using new technologies) "to create richer and more resonant descriptions of users and technologies" (p52). But Janet Finch's (1987) use of "vignettes" offers some pointers as to why scenarios may be appropriate for a critical artefact methodology.

Finch describes her use of vignettes, "short stories about hypothetical characters in specified circumstances, to whose situation the interviewee is invited to respond" (ibid., p105), to survey beliefs about family obligations. She suggests two ways in which the technique is better suited to the study of normative issues than other survey techniques such as direct and open-ended questions. Firstly interviewees respond to hypothetical social situations rather than express their beliefs and values in a vacuum – accepting that meanings are socially constructed, the vignettes provide the social contextualisation which would otherwise be absent; and interviewees don't need to articulate their values and beliefs directly as they are inferred from their responses. Secondly vignettes place a comfortable distance between the interviewees' personal circumstances and the hypothetical situations portrayed – interviewees may find it difficult to discuss intimate details of their own lives, but commenting on (hypothetical) other people's lives is much easier.

Finch demonstrates that vignettes can be useful in enabling survey interviewees to make normative statements (what they consider to be 'normal') in relation to their beliefs and values. So, in a critical artefact methodology, using a similar technique of scenarios describing an artefact's use should enable

users to engage with the values and ideologies that those artefacts embody and their own personal values.

1.7 Human-centred design

My MA project aimed to develop innovative product ideas from an understanding of their likely users – the assumption being that products should be designed to fit the needs and practices of their users. This is not a radical idea and such user-centred design has been practiced for many years. Renowned industrial designer Henry Dreyfuss recognised the importance of understanding users and how designing products to fit their needs is commercially and socially appropriate and useful. Reflecting on 25 years of his practice, Dreyfuss (1955) wrote:

> *'I have washed clothes, cooked, driven a tractor, run a Diesel locomotive, spread manure, vacuumed rugs, and ridden in an armoured tank. I have operated a sewing machine, a telephone switchboard, a corn picker, a lift truck, a turret lathe, and a linotype machine. [..] We ride in submarines and jet planes. All this in the name of research." (p64)*

> *'For years in our office we have kept before us the concept that what we are working on is going to be ridden in, sat upon, looked at, talked into, activated, operated, or in some way used by people individually or en mass. If the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed. If, on the other hand, people are made safer, more comfortable, more eager to purchase, more efficient – or just plain happier – the designer has succeeded." (p23-23)*

We are more likely to buy a product that closely satisfies our needs than one that doesn't. 'Usable' products that complement our practices are easier to use, simplify our lives and reduce our workload. Numerous people such as cognitive psychologist Donald Norman (1990) have justified and promoted such views.

However user-centred design has some inherent limitations. Firstly it depends on a clear understanding of who the user is. In some contexts this may be difficult. For example who is the user of an exercise apparatus for injury rehabilitation – the patient, their physiotherapist, the hospital facilities

manager? And, as this example also demonstrates, there may be many individuals affected by the design of a product. Focussing on just the 'users' may ignore the needs of others. In recent years these limitations have been recognised and an alternative paradigm developed. 'Human-centred design' includes a more diverse set of people affected by a product in its design. Such people are often termed 'stakeholders', relating to those who have a 'stake' (a vested interest) in the design of a product or system.

Although the concept of human-centred design is widely accepted in design research, the term 'stakeholder', although generally recognised, is not universally agreed. For example some choose to see stakeholders as being a sub-set of all those affected by a product or system, in particular those with a financial interest[12]. However I choose to use stakeholder in the broader sense of relating to any interest and not restricting this definition to financial terms.

Human-centred design is more than designing products from an understanding of stakeholders rather than just 'users'. Richard Buchanan (2001) argues that its primary purpose is in supporting human dignity. He notes that a focus on making products easier to use (usability) does not call us to question what this use is and who it serves. He notes the move from an "old view" of design as form and function to a "new view" of form and content (ibid.). This resounds with the themes in critical design: in designing products we embed assumptions about their use and the values associated with it. Buchanan is suggesting that in undertaking human-centred design we attend to how this content (the embedded assumptions) can support human dignity: "[Human-centred design] is an ongoing search for what can be done to support and strengthen the dignity of human beings as they act out their lives in varied social, economic, political and cultural circumstances." (ibid., p37)

Wright et al. (2006) suggest that the conceptual move from users to stakeholders – along with other conceptualisations of design, particularly in human computer interaction (HCI) – is more usefully considered as a set of co-existing perspectives rather than a historical development wherein one

[12] Several discussion threads on the email discussion list PhD-Design in April 2007 are illustrative of this: http://www.jiscmail.ac.uk/cgi-bin/webadmin?A1=ind0704&L=phd-design (last accessed on 3/10/2008)

approach replaces another. Considering people as users may have limitations, but within those limitations it still has value. The term stakeholders also brings with it connotations, people's actions are considered in relation to their 'stake' in something, but they might also be considered as 'owners', 'consumers', 'critics', 'fans' etc., each with their own connotations. McCarthy & Wright (2004) suggest an approach focussing on experience as it is lived and felt, and that this relies on a dialogical encounter between the designer, the 'user' (recognising the limits of this term) and the artefacts designed as multiple centres of value. According to their account, experience is something that must be felt and lived (it can't be designed in advance) and as such it is developed between designers, 'users' and artefacts/environments, each bringing their own presuppositions to the dialogue[13].

So, a critical artefact methodology fits within the paradigm of human-centred design and as such it depends on an engagement between the designer and those who may be affected by the artefacts that are designed. As noted above, referring to such people as 'users' implies a limited view of their relationship to the artefacts and Wright suggests similar problems with 'stakeholders' (or, indeed, any one term). But I need a working term for my ongoing discussion, so I will continue to use 'stakeholders' but with a specific inflection: stakeholders meaning those who have a 'stake' (not purely in a financial sense) in what is designed, but by doing so not limiting the design activity to simply satisfying these 'stakes'. Stakeholders' relationships with artefacts (or interactions, systems, environments etc.) can be conceptualised in many ways in addition to 'having a stake' in their design, and the manner in which artefacts (etc.) are designed should take account of these other relationships – designing for more holistic ends (such as supporting human dignity, after Buchanan) rather than designing to satisfy stakeholders' interests alone.

[13] This paragraph is also based on conversations with Peter Wright, at the time of writing Professor of Human Centred Design at Sheffield Hallam University.

1.8 The PhD and thesis in outline

The aim of this research is to develop a critical artefact methodology and the thesis will describe critical artefact methods in operation through the programme of practical work. In the research I have explored and demonstrate strategies for dealing with where and when such methods might be used, the nature of their outcomes, how to select appropriate participants and how to run the workshops central to the process. The aim of the thesis is to show these strategies in action, evaluate them against relevant theory, and provide designers with material that will inform the development of their own methods.

The work in my MA project was speculative and opportunistic. I appropriated ideas and invented methods to see if they could be useful. My use of critical artefacts was effective in the particular context of novel digital photograph products. Although I was not devising prototype critical artefact methods, the conceptual design workshops did point to what a critical artefact methodology might include. With hindsight, this preliminary work outlined some basic features of a critical artefact methodology, namely that:

- It fits within the paradigm of human-centred design – it aims to include a wider set of 'stakeholders' rather than just users and to develop a richer understanding of needs beyond usability;
- It is directed towards innovation – the development of new product ideas;
- Stakeholders participate in discussion workshops;
- These workshops centre on the presentation of conceptual designs;
- These conceptual designs consist of artefacts and usage scenarios;
- Presenting critical artefacts (the products of critical design) enables stakeholders to engage with novel situations;
- The designer participates in the discussion workshops, and this participation somehow builds their understanding of stakeholder needs in the context.

Two other features were present in my original research proposals that I have subsequently left behind. Firstly, that a critical artefact methodology enables design for experiences unfamiliar to stakeholders. The idea of

designing *for* experience is not problematic (for example Wright & McCarthy 2005), however demarcating unfamiliar experiences is difficult – all new products afford experiences that are unfamiliar to some degree. I resolved my thinking better by clarifying the nature of the innovation that critical artefact methods aim to produce: innovation in a radical, paradigm-questioning (or, potentially, paradigm-breaking) sense rather than a gradual, step-wise sense. Such radically innovative products would satisfy stakeholders' future and *latent* needs as well as their existing needs. Others have discussed the notion of latent needs,[14] which could be summarised as needs that stakeholders are unaware of, but recognise as relevant to them once satisfied. So, to rephrase, a radically innovative product could be one that satisfies needs that stakeholders were not previously aware of, but can appreciate their benefit once these needs are addressed by the product. It is therefore worthwhile clarifying the last basic feature of a critical artefact methodology as:

- The designer participates in the discussion workshops, and this participation somehow builds their understanding of stakeholders' existing, future and latent needs in the context.

Secondly I originally proposed that designers' visionary ability – an ability to imagine (and synthesise) solutions which stakeholders cannot (yet) recognise as relevant to their needs – is a vital element of a critical artefact methodology. This may be true, but stating it as a feature could pre-dispose my thinking about a critical artefact methodology's operation. I preferred to base this thinking on empirical data of critical artefact methods in operation.

From this starting point there was much work to do to define and evidence a complete critical artefact methodology (and determine whether such a thing was possible at all).

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[14] For example: the Design Council's glossary of ergonomics terms includes a definition of latent needs as "user needs which the users themselves may not have thought about but which when met, deliver delight and exceed expectations" (Davis 2008); a definition appearing in the Harvard Business Review suggests "latent needs (qualities or features [consumers] seem to want but have trouble articulating)" (Leonard-Barton et al. 1994, p124); Sanders (2001) describes latent needs as "needs not recognizable until the future"; and a design textbook suggests that product development should address latent as well as explicit needs (Ulrich and Eppinger 2008, p54).

The methods I used in the preliminary work prompt questions about existing practical approaches. My discussion workshops informed what I designed, how do critical artefact methods relate to other approaches where stakeholder participation informs design activity such as co-design and participatory design? My workshops also centred on the discussion of conceptual designs, how does this relate to other approaches where artefacts are used to engage with stakeholders? Finally, I participated in and observed the workshops *as a designer*, what value is there in designers doing participant/observation (as opposed to, say, ethnographers)? What is the aim of participant/observation in a critical artefact methodology and how does it differ from other approaches? Chapter 3 answers these questions.

In the preliminary work, critical artefacts enabled stakeholders and designer to engage with novel situations on a deeper, less mundane level – greater reflection on embodied conceptual ideas, lesser evaluation of concepts' form and function. This could be seen to relate to Critical Theory's aims of enlightenment and emancipation. How do these aims manifest in critical design and other practices that share the same theoretical ancestry in Critical Theory? What are the similarities and difference with how enlightenment and emancipation are achieved in a critical artefact methodology as I propose and develop it here? These issues are discussed in chapter 4. An earlier version of part of this discussion has been published previously as a paper at a European Academy of Design conference (Bowen 2007).

Chapters 3 and 4 position a critical artefact methodology in respect to existing work and suggest some theoretical ideas to support its operation. However empirical data was required from which the specifics of the methodology's implementation and operation could be deduced. This meant evidence of the methodology working well – producing significant insights and innovative product ideas. Chapter 5 describes how such a set of 'good' data was produced. In particular how the first large-scale project *Living Rooms* suggested factors affecting the efficacy of the methodology and how the more productive project *Digital Mementos* took account of and validated these factors. A part of this discussion has also been published previously as a paper at a Design Research Society conference (Bowen 2008).

In both *Living Rooms* and *Digital Mementos* the development of a critical artefact methodology was subsidiary to the principal aims of the projects' lead investigators – academics at Sheffield Hallam University and the University of Sheffield respectively, who were interested in the results of using critical artefact methods as a research tool. However in both projects I devised and managed the stakeholder engagement activities and was therefore able to ensure they were directed towards the research aims of this PhD – an environment in which to develop such methods[15]. I have also reported the results of the *Living Rooms* project in a co-authored paper given at another Cambridge Workshop on Universal Access and Assistive Technology (CWUAAT) (Bowen & Chamberlain 2008).

In chapter 6 I discuss my reflections on the operation of critical artefact methods as I experienced using them in *Digital Mementos.* From these reflections, I propose and describe a critical artefact methodology with supporting reasoning from my review of existing practices and theory.

My conclusions on the work, in chapter 7, include a description of my contribution to knowledge and a review of the research methods and research methodology that produced them. Through this re-consideration I discuss the rigour of the work and suggest the limitations of the knowledge produced – in particular the generalisability of its application. Finally I outline potential directions for future work developing and extending the research.

Chapters 3 to 7 describe the process of the research, the ideas developed and the knowledge produced. This research was conducted in a particular manner: centring on my experiences of participating in the implementation of a critical artefact methodology myself, as a designer. I was a participant/observer in the development of a critical artefact methodology as well as participant/observer in the projects applying critical artefact methods. My research methods and research methodology may become apparent through my description of the research, and will be reviewed in my conclusions. However they affect the claims I make in the remainder of the thesis so I will

[15] The exact nature of my involvement in these projects is discussed in 5.2 (p128) and 5.5 (p145).

begin by discussing them. For that reason, in chapter 2, I discuss my research methods and methodology.

2 Methods & methodologies

2.1 Introduction

In chapter 1 I 'set the scene' for the research discussed in this thesis, describing my preliminary work and others' existing work that led to my interest in a critical artefact methodology. Before discussing my methods for undertaking this research, and their methodological and epistemological foundation, I should clarify what I intended to research, the outcomes I expected to produce, and the audience I envisaged for these outcomes.

This research was focussed on developing a methodology to support practical methods that employ critical artefacts to foster innovation – a critical artefact methodology. The intended outcome was therefore both this methodology and the methods that apply it. I anticipated that these outcomes would be of interest to design academics (those interested in the nature and theories of design activity) and provide insight to designers into relevant techniques for their own professional practice.

The methodology of practice this research aims to create and the methods associated with it I will term a *critical artefact* methodology and *critical artefact* methods. The research project itself also requires a methodology[16] and associated methods; I will refer to these as *research* methodology and *research* methods to avoid confusion.

In the second part of this chapter I will discuss the research methods I employed during this research. But before doing so, in the first part of this chapter, I will clarify my rationale for using these methods – my research methodology.

2.2 Research methodology

My primary strategy in conducting this research has been to devise and apply critical artefact methods in actual design projects in order to understand what a

[16] A methodology for producing the methodology – the 'methodology squared', if you like.

critical artefact methodology might be. In these design projects, I have been the designer (or one of several designers) using critical artefact methods to 'do the designing' – to produce design concepts in response to the contexts under investigation. So, I have practiced design in order to conduct research. This research then could be said to be practice-led research, but some more clarity is required; particularly in terms of the rigour of such research and the types of claims that it can make.

2.2.1 Practice-led research

Bruce Archer (1995) has discussed what forms of practitioner activity, including design practice, might be considered research. More particularly, he discusses possible relationships between practice and research and concludes that not all practitioner activity is equivalent to research activity in an academically rigorous sense – "systematic enquiry whose goal is communicable knowledge" (ibid., p6). Archer suggests three possible relationships between research and practice[17] (ibid., with my own rephrasing appended):

- Research *about* practice – enquiry focussed on practice;
- Research *for the purposes of* practice – enquiry to inform or provide material for practice;
- Research *through* practice – enquiry achieved via practice.

Archer suggests that the *about* and *for the purposes of* forms of research can qualify as academically rigorous research *providing* they adhere to the criteria of the research traditions they fit within. In this respect, he summarises the Science and the Humanities research traditions. As Archer explains, both traditions provide a rationale for research activity and clarify the nature of the findings produced. For the Science tradition, he relates this to a view of scientific experiment as conjecture and refutation (following Karl Popper's critique of scientific method) – the 'best' hypothesis is the one that resists

[17] Christopher Frayling (1994) has suggested a similar set of relationships between research and art and design: research *into* art and design (akin to Archer's *about*), research *through* art and design (akin to Archer's *through*), and research *for* art and design (akin to Archer's *for the purposes of*). Although Frayling arrives at this classification by discussing how the stereotypes of artists, designers and scientists (as seen in, as he suggests, popular cinema) are inaccurate and lacking, his conclusions are compatible with Archer's. As Archer's paper deals more explicitly with methodology, I have used his definitions in my discussion.

refutation. For the Arts tradition (as a subset of the Humanities tradition), he notes the subjectivity inherent in conducting and evaluating research and the consequent need for the researcher (and their audience) to declare and acknowledge their theoretical standpoint – the hypothesis depends on who wrote it and who is reading it.

So for example, according to Archer, a study of existing artworks (the *about* relationship above) can be research if it adheres to the principles of the Arts research tradition (such as acknowledging the theoretical standpoints of the artist and commentators of the work); and a study of materials to inform manufacturing (the *for the purposes of* relationship above) can be research if it adheres to the principles of the Science tradition (such as exercising scepticism of any data gathered and arguments made). But Archer suggests that the *through* relationship offers another interesting possibility: that the practice activity itself might qualify as research (rather than research as a separate activity that attends to or is prior to the practice activity).

For Archer, research through practice can be seen as Action Research. Action Research, as an approach, recognises that (in Archer's words):

> *"There are circumstances where the best or only way to shed light on a proposition, a principle, a material, a process or a function is to attempt to construct something, or to enact something, calculated to explore, embody or test it." (ibid., p11).*

The situation I found myself in beginning this research was similar to the circumstances Archer describes here: a novice researcher, but with practical experience of the effectiveness of critical artefact methods in one situation (the preliminary work – see 1.2, p15). So, a legitimate way to investigate a critical artefact methodology was design practice – further applications of critical artefact methods.

I will discuss how my research methodology relates to Action Research in more detail later (2.2.2, p37), but Archer's qualifications to research *through* practice as Action Research are worth noting here. Firstly, he suggests that it should adhere to "normal rules governing research practice": knowledge directed; systematically conducted; unambiguously expressed research questions; transparent methods; recorded data/observations; and the whole

published and critically examined. Secondly, because the researcher is present in any intervention (the 'action' part, the practice) he suggests they should clarify the exact nature of this intervention and their theoretical, ideological and ethical position in making it. Thirdly, Archer suggests:

> *"[..] because Action Research is pursued through action in and on the real world, in all its complexity, its findings only reliably apply to the place, time, persons and circumstances in which that action took place. It is thus difficult and dangerous to generalise from Action Research." (ibid., p12)*

Although the findings of Action Research are highly situation-specific, Archer suggests they can lead to more generalisable research by providing case account material to inform it. This suggests some restrictions on the claims I can make for my research findings – I can demonstrate a critical artefact methodology that, while it relates to the particular circumstances of its application, may suggest practical methods to designers that may operate in a more general capacity.

Archer therefore provides a useful description of practice-led research that I can use to justify my research methodology:

> *"[..] practitioner activity can count as research if, and only if, it accords with the criteria of research. It must be knowledge directed, systematically conducted, unambiguously expressed. Its data and methods must be transparent and its knowledge-outcome transmissible. But like all Action Research, research through practitioner action must be recognised as very probably non-objective and almost certainly situation-specific." (ibid., p13)*

2.2.2 Action Research

Although, as discussed above, Archer has suggested that research *through* practice is Action Research, and I have suggested that my research uses such tactics, I am reluctant to declare my research *as* Action Research. This is mainly because Action Research has various embodiments and assuming my research is similar to one or other of them may cause confusion. For example: Zuber-Skerritt (1992) presents three forms of Action Research as defined by Carr and Kemmis – technical, practical and emancipatory; and Smith (2007)

characterises two versions of Action Research – a "British Tradition" of enquiry focussed on the improvement of practices (and understanding of them) via their practice "close to the notion of reflective practice coined by Donald Schön", and a more political version of Action Research, common in the USA and social welfare fields, of enquiry focussed on social change with the practitioner "actively involved in the cause for which the research is conducted" (ibid.). Although my research methods have some resemblance to, say, Smith's 'British tradition', I shall resist declaring them as such as there may be subtleties and differences between them that emerge later. For example, Action Research has been applied frequently to research into, and the improvement of, education practices (e.g. Zuber-Skerritt 1992 and Kember 2000), but in this context its application is often of a more rigid and formulaic form than is compatible with design practice.

So, rather than saying my research *is* Action Research, I suggest the practical element of my research *shares features with* Action Research and can therefore make similar claims for rigour.

Bob Dick (2000) offers this definition in his *Beginner's guide to Action Research*:

> *"Action Research consists of a family of research methodologies which pursue action and research outcomes at the same time."*

Action Research aims to produce change (action) and understanding (research) at the same time, although not always in equal amounts.

Kember notes that "there are several schools or variants of Action Research [although] there are characteristics common to Action Research that collectively distinguish it from research conducted under positivist or interpretive paradigms" (2000, p23). Kember's characteristics of Action Research have strong parity with descriptions provided by Dick (2000) and Zuber-Skerrit (1992). According to these descriptions, the features of Action Research are:

- *It is concerned with improving social practices.* Social practices are the subject matter of Action Research, and there is an inherent appreciation (by the investigators) of these practices as being in need of, and capable of

fostering, change: "a project takes as its subject-matter a social practice, regarding it as a form of strategic action susceptible of improvement" (Carr and Kemmis quoted in Kember 2000). The 'action' aspect in this respect is the subject and means of change – practice to improve practice;

- *It is a cyclic process, systematically conducted.* Kurt Lewin first proposed the term Action Research as a series of cycles (or spiral) of planning, acting and reflecting on the action in the 1940s (Smith 2001). All forms of Action Research hence essentially share a central cycle of action and critical reflection on that action to then inform further iterations of the cycle – as summarised in Figure 2.1. The steps within each cycle may overlap, but they are all present in each cycle;
- *It is a participative process.* This has two senses, firstly in that "the clients and informants are involved as partners, or at least active participants, in the research process" (Dick 2000), and secondly in that the investigators are also practitioners and involved in every step – so, for example, in Action Research in education, teachers are involved in the planning and reflection steps in addition to the action step (teaching);
- *It is a reflective process.* Participants critically reflect on the outcomes of the research, their own involvement (self-reflection), and the research process itself: "between each cycle, the research participants critically reflect on the research, to improve the design of the next cycle." (Dick 2000)

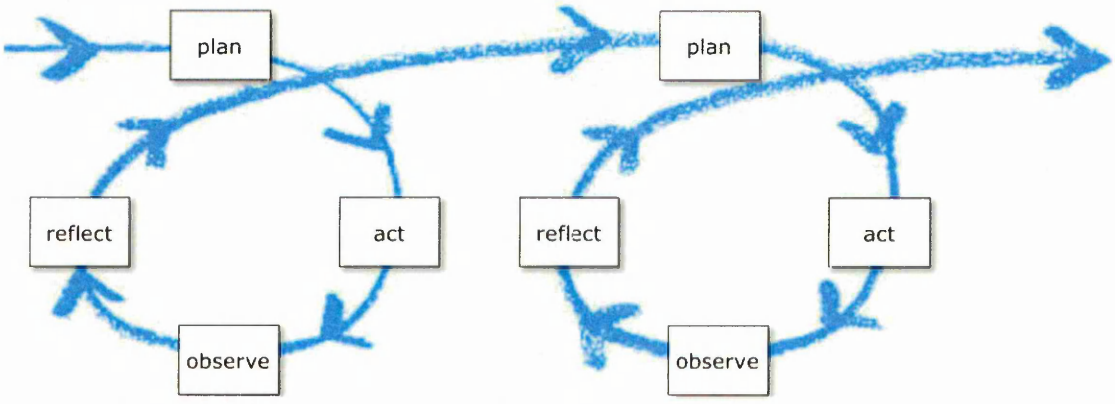

Figure 2.1 Action Research as a series of cycles or as a spiral
(adapted from Kember 2000 and Zuber-Skerritt 1992)

As Dick noted earlier, Action Research produces change at the same time as understanding. Its concern with social practices clarifies this –

understanding practices in order to change them (at the same time). Hence this understanding, as Archer noted above, is situated in and specific to the practice to which it relates.

Cal Swann (2002) has discussed how designers might translate their practices into a form useful for design research by adhering to Action Research methodology. He notes how designers' ways of working are more suited to interpretive rather than positivist research modes, shows the similarity between the design process and Action Research and suggests aspects designers should attend to in order for their practice, and their account of it, to be valuable as design research. Swann concurs with the features of Action Research I summarised above, and discusses how design relates to: a concern with social practices; a systematic cycle of planning, action and reflection; and the use of participation.

Swann notes how design has evolved from trade activity, to a set of professions, to a field or discipline – with a consequent shift from design serving industry to design (as a field of academic discourse) as being able to lead or challenge industry. He describes how earlier 'scientific' or 'engineering' accounts of design implied a modernistic view of 'design for the greater good' and a shift towards more 'social science' accounts accepting the pluralistic/subjective nature of what 'good' is, relating to post-modern critiques of modernism. Designing relies on developing an intuitive understanding of social phenomena, and therefore is particularly suited to interpretive research in the latter mould:

> *"[..] the end usage of a designed product [..] belongs in the social science world. Design deals in human interactions with artifacts and situations that contain a great deal of uncertainty. Design research is tied to a domain that derives its creative energy from the ambiguities of an intuitive understanding of phenomena." (ibid., p51)*

So, like Action Research, design (as a field or discipline) is concerned with social practices – those associated with the use of designed products; and the design of products can change social practices. Design practice then offers a medium for Action Research.

The design process itself, according to Swann, is also similar to the Action Research spiral, with cycles consisting of problem/research, analysis, synthesis, execution, production, and evaluation. He stresses the steps within each cycle may overlap and follow a non-linear sequence (characteristic of a holistic or 'right brain' style of working) but, this aside, the design process can be seen as "an action process centred round synthesis" (ibid., p55). Swann suggests that design processes should be more systematic in order to be useful as research activity, and that they are often lacking in this respect. In particular the research process must be visible but:

> *"[..] 'systematic and documented study' is a failing which design practice has perpetuated for many years. [..] Too often, designers scorn writing about their practice in anything other than journalistic and celebratory terms" (ibid., p58)*[18].

In this respect, Swann suggests that designers should provide more evidence of the process of creation and be self-critical of their role within it.

Swann suggests that participation is likely to be less within professional design than the type of collaboration within Action Research, and, crucially, that this participation will not be focussed on emancipation. Of such professional design projects Swann suggests:

> *"[..] few will genuinely include the users, consumers, and the public into the circle of participants, although this is beginning to occur. Participation and collaboration in Action Research requires that all those participants share in the developmental process in an emancipatory role." (ibid., p56)*

So, to rephrase, the stakeholders[19] of a product should participate in its design with the aim of improving their practices connected with it.

Finally Swann notes that "[..] the opponents of Action Research say that a record of professional practice is not contributing new knowledge, which is the primary purpose of research" but he suggests that such Action Research accounts provide case-studies that can transcend the normal situation and give

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[18] Swann's view concurs with Archer's requirements for research, discussed earlier, as systematically conducted, with unambiguously expressed research questions, transparent methods, recorded data/observations, and the whole published and critically examined.

[19] 'Stakeholders' here refers to the wider group of people who have a 'vested interest' in the design of a product, as discussed in 1.7 (p26).

insights into new areas: "Designers not infrequently invent new answers to conventional situations that transcend the ordinary, with the result of creating a higher order of thinking about that situation" (ibid., p60). In this respect, the designed artefacts can embody insights that prompt new understanding.

To summarise, Swann (and Archer) supports my use of design practice as a legitimate form of research providing it adheres to the features of Action Research, and as a consequence it can inherit Action Research's claims for rigour.

2.2.3 Theoretical position and epistemology

Archer (1995) notes the importance of a declaration of theoretical position in research conducted under the Humanities tradition. In such approaches, such as Action Research, the knowledge produced depends on the theoretical positions of the researchers and the audience of the research. This knowledge depends on an *interpretation* of the research findings by an audience armed with an appreciation of the researchers' theoretical position (which they may variably agree with).

As I have discussed above, my research methodology closely relates to Action Research, so, following Archer's rationale, it is important to describe the theoretical position that informs it. Crotty's review (2003) of the theoretical foundations of social research provides a useful starting point for this discussion although it does not claim to be, and is not used here, as a 'menu' of strictly defined positions from which to choose.

Crotty suggests a relationship between research methods and theoretical position: methods fit within a methodology[20], which relates to a theoretical perspective, which in turn is informed by an epistemology (see Figure 2.2).

Crotty adds another layer to Archer's discussion: the fact that (in his terms) a theoretical perspective relates to an epistemology – a particular view of the nature of knowledge. His diagram re-enforces Archer's point that research outcomes depend on the theoretical (and, consequently, epistemological) stand

[20] In Crotty's scheme, methods are *chosen* according to a methodology. But this implies that methodology comes first, which may not always be the case. Methods might be chosen that 'feel' appropriate or generate 'useful' results and the methodology may emerge as the research develops.

point of the researchers. The research's epistemology sets out the view of knowledge embodied in its findings – to understand what knowledge is produced, it is important to understand how the researchers conceptualise *how we know what we know* such as notions of truth and meaning.

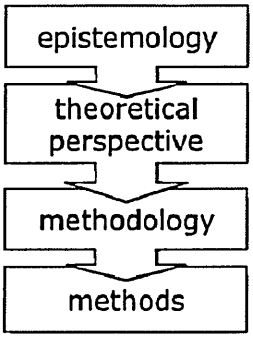

Figure 2.2 relationship between epistemology and methods (adapted from Crotty 2003)

A significant distinction to make is between objectivist and other epistemologies. An objectivist epistemology espouses that "truth and meaning reside in their objects independently of any consciousness [..]" (ibid., p42). Crotty uses the meaning of a 'tree' to illustrate this: to an objectivist, a tree is a tree regardless of whether anyone is conscious of it or not – its 'tree-ness' is inherent within it. Objectivist research aims to discover objective 'truths' – that 'a tree is a tree'. In this case, the knowledge is independent of the researcher and the audience – the tree is a tree irrespective of their presence. However, as Crotty points out, alternative epistemologies, such as constructionism and subjectivism, suggest a different view of knowledge – rejecting the notion of *objective truth* and emphasising the importance of human beings in the creation of *meaning*.

A detailed discussion of epistemologies is beyond the scope of this thesis, but it is important to note that my research is *not* objectivist. This affects the claims I make for the research findings – they are not presented as objective truths, and some familiarity with my conceptualisation of their meaning is needed to interpret them.

Action Research also follows from a non-objectivist epistemology, and in the case of my research I suggest this epistemology is *constructionism*, which Crotty defines as:

> *"[..] the view that* all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context." *(ibid., p42, his* emphasis*)*

In this view, we construct meaning in our interactions between ourselves and the physical world. Constructionism does not deny that, for example, a tree exists as physical phenomena, rather that its 'tree-ness' is a human construct. Meaning is intentional in that it is always directed (intended) towards something – "consciousness [..] is always consciousness *of something*" (ibid., p44), and is generated in the interaction between subject and object – constructionism embraces neither subjectivity or objectivity, it is somewhere between the two. In this respect, Crotty suggests that all meaning is *socially* constructed. So, returning the example of trees:

> *'We learn that trees are trees and we learn what trees should mean to us. In infancy and childhood we learn the meaning of trees from the culture in which we are reared. Trees are given a name for us and, along with the name, all kinds of understandings and associations. They are a source of livelihood if the setting for our childhood is a logging town. They constitute a focal point of lively aesthetic pleasure if we grow up within an artists' colony. They are the subject of deep reverence, fear perhaps, if we come to adulthood within an animist community. They may have very little meaning at all if we come from a slum neighbourhood in which there are no trees." (ibid., p56-57)*

So, if my research is done in a constructionist mode, its findings should be evaluated as *a constructed meaning* rather than *the objective truth* and consequently they should be *interpreted* according to the conditions of this construction. This meaning derives from the research participants' socially constructed culture and personal understandings (and those of the research's audience). For example to understand the findings it is important to appreciate the meanings inherited from and embedded in design practice, Western first world society, academia etc.

Returning to Crotty's illustration of the relationship between research methods and epistemology (Figure 2.2), I can describe the theoretical position of my research approach using his hierarchy, as shown in Figure 2.3.

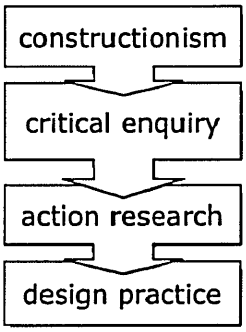

Figure 2.3 my theoretical position according to Crotty's hierarchy

As practice-led research, the main method for conducting my research is design practice. Archer (1995) and Swann (2002) suggest this practice can qualify as research within an Action Research methodology, as discussed above (2.2.2, p37), and ultimately this methodology is informed by a constructionist epistemology. The theoretical perspective between the two relates to forms of critical enquiry, which question fundamental assumptions about what they investigate and seek to change as well as understand it. In my research, this is a questioning of design's role, operation and products, and is informed by ideas within Critical Theory. I will discuss these ideas, and their relationship to my work, in more detail in chapter 4 (p84).

2.3 Research methods

In this chapter, I have outlined my research methodology ahead of discussing my research methods, but in fact this methodology was not in place prior to the research's commencement. Instead, it emerged during the practical activities when I recognised its similarity to Action Research. In this respect, I adapted the research methods I employed throughout the practical work as circumstances dictated rather than rigidly adhering to a fixed methodology. To an extent, the research methodology and critical artefact methodology were developed in parallel.

As my research methods were refined during the practical work, I will not discuss them in detail here. Rather, I will outline them and provide more detail of their exact implementation, and evolution, in the remainder of the thesis. It is my intention that a sense of the research methods and research methodology

(and critical artefact methods and critical artefact methodology) will emerge through my description of the research as it developed.

As noted above (2.2, p34), my central strategy for conducting this investigation was to participate in design projects as a designer (or one of several designers). I documented and reflected on this participation using video recording and transcription. Designing (design practice) was also used to reflect upon and develop the critical artefact methods used in the design projects, as well as within those methods themselves.

2.3.1 Participation in design projects

I will describe the exact nature of my participation in design projects in two specific larger studies in chapter 5, but it is worth discussing my role within these projects and the larger research project here: as design practice was a fundamental part of my research methodology, what were my roles within it? When was I behaving as a designer and when was I behaving as a researcher? My research methodology's similarity to Action Research explains how I behaved as both, but in varying amounts at different times.

During the design projects, applying a critical artefact methodology, I was behaving as a designer, but in a particular way. As Archer and Swann noted, I must clearly document my data – my experiences and the development of design ideas as a result. In this respect I was also behaving as a researcher – attending to the rigour of this documentation. But I also behaved as a researcher by critically reflecting on my activities – prior to another Action Research cycle of action and reflection.

So, in the design practice elements of the design projects my primary role was a designer. However alongside this practice, and to a greater extent during and between design projects, I also had the role of researcher – particularly in the manner in which I reflect upon and document my design practice, methods and evolving thinking. The other research methods I used demonstrate this last aspect.

2.3.2 Video recording

Beginning with the preliminary work, all the discussion workshops were video recorded for later reference. The technical set-up was similar in each case: a single camera in a fixed position (on a tripod) using a wide-angle lens and external omni-directional microphone[21] placed amongst the workshop participants. A typical room layout is shown in Figure 2.4. Stakeholders sat in a semi-circle facing a physical projection screen, plasma/LCD display or large laptop screen, with the camera pointing towards them. The camera's field of view captured all the participants including, where possible, myself and any other designers.

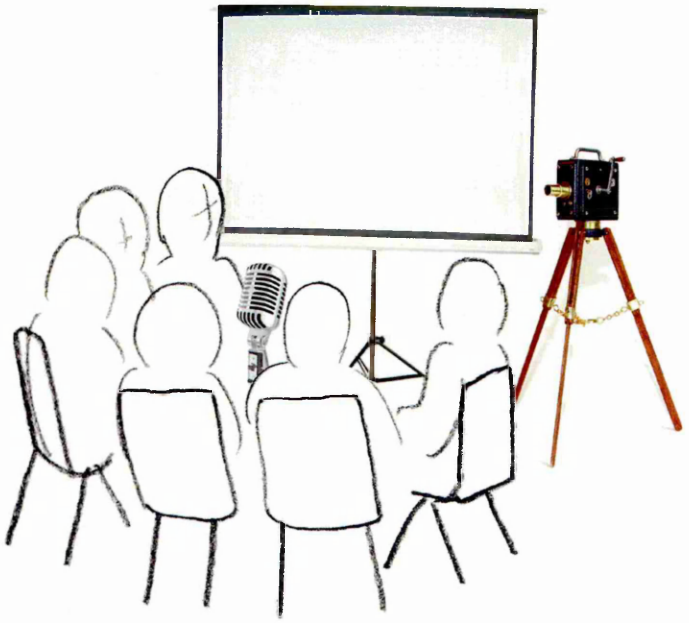

Figure 2.4 a typical workshop room layout

Video recording the workshops freed me from note-taking, and I was therefore able to concentrate more completely on participating in the discussions (and having the role of 'the designer' as noted above[22]). However the way in which I used the video recordings changed from the preliminary work to the main studies.

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[21] Omni-directional microphones have non-directional characteristics, they pick up sound from all directions (within practical limits).

[22] Stakeholders were also told that I (and my colleagues) was participating 'as a designer'; this is discussed further in chapter 5.

In the preliminary work I reviewed video recordings of stakeholder workshops and produced 'video logs'. Although textual, these logs were not exact transcripts rather they were notes I made whilst reviewing the recordings. During this process I realised that I needed to use the video recordings in two distinct ways: to inform the design of further concepts and as reference material for the development of critical artefact methods. Consequently I categorised my notes according to whether they related to (in my terms at the time, see also example excerpt in Table 2-1):

- What I found out - information and issues discovered about the design problem (Table 2-1 – plain black text);
- What I found out about finding out – issues discovered about the research method itself (Table 2-1 – italicised blue text);
- Design ideas for development (Table 2-1 – bold green text).

Time	Notes
0:09:30	Pe asks questions about 'hole-in-the-wall' interface – *is it important that details of illustration/concept are resolved? People can't imagine or react to otherwise?*
0:09:50	I say concepts are deliberately not well formed (resolved). Pe rightly says they are just "going for me" (criticising ideas) – *asking people to criticise designs it is difficult to get them to focus on the overall concepts and not the specific details of their resolution*
0:10:00	I give 'don't keep money stuffed in mattress' analogy.
0:11:00	S asks why are photos in bank not on card's chip?
0:11:20	Pe – **if you lose the card would be "disturbing" that someone else could access your photos, your "life".**

Table 2-1 excerpt from preliminary work 'video log'

Using the video recordings for these two activities at the same time was confusing, but also could mean that certain observations and opportunities for reflection were missed. So in the subsequent studies I split my use of the video recordings into two separate activities.

Firstly I used the video recordings *between* workshops as part of my design practice: watching them to inform my design activity. I made sketches and notes, developing existing and new design ideas, in response to the discussions

in the workshops. The recordings thus offered a way to 're-immerse' myself in the workshop discussions and continue my reflection on them via designing[23].

Secondly I used the video recordings *after* the workshops to provide reference material for the effectiveness of the critical artefact methods. I produced transcripts of every workshop (discussed below) as the basis for further reflection.

Again, Action Research provides some support for my methods (splitting the use of video recordings into two, separate activities). As the first instance is within the action step of an Action Research cycle, the focus should be on the practice element of the research – doing the designing as the designer. As the second instance is part of the reflection step of the cycle, the focus should be on reflection on the effectiveness of the action – the designer's reflection on their practice.

2.3.3 Transcription

I transcribed all the workshops from the two larger studies, *Living Rooms* and *Digital Mementos.* As I will discuss in chapter 5, these transcriptions were not used as the basis for coding activity according to any formal scheme. Rather the activity of transcription provided another opportunity for me to 're-immerse' myself in the workshop discussions. It is significant that I transcribed discussions that I was also a part of. Hence transcription allowed me to reflect upon and re-examine my experiences of participating in the workshops, my experiences of how effectively the critical artefact methods were operating.

2.3.4 Designing

Sketching, modelling and brainstorming were part of my process for developing product ideas – such designing was an inherent part of the design practice I undertook. But I also used designing as a way of reflecting on the design practice itself, see Figure 2.5. As I will discuss in chapter 6, I used sketching and diagrammatic modelling to explore my understanding of critical artefact methods and a critical artefact methodology. I sketched various

[23] This use of designing as a way of 'processing' the workshop discussions is discussed in 6.2.4 (p171).

diagrams of how a critical artefact methodology might operate, to refine and develop my understanding. Numerous diagrams were made and then rejected but, in producing them, I refined and expanded my thinking. In this way, a 'bad' diagram (an inadequate representation of my understanding) might indicate what a 'good' diagram could be (by opening up further possibilities and resolving what an adequate representation is).

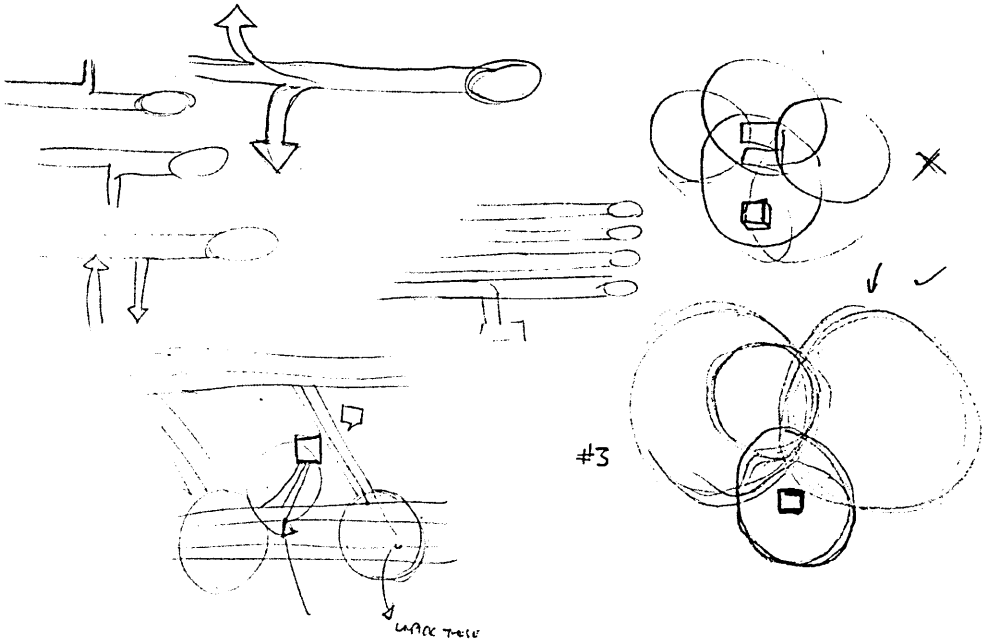

Figure 2.5 thinking about critical artefact methods' operation via sketching

2.4 Conclusion

Bruce Archer (1995 and above – 2.2.1, p35) suggested three possible relationships between research and practice. The research to be reported here includes all three in some respect:

- research *about* practice – in producing a critical artefact methodology (the end product of the research) that could suggest new applications for design;
- research *for the purposes of* practice – in producing a critical artefact methodology from which designers can derive practical techniques relevant for their own professional practice; and
- research *through* practice – in using critical artefact methods in design projects to develop a critical artefact methodology.

The last item describes my research methodology for achieving the first two items – in other words, practice-led research.

Archer and Swann both support the notion of design practice as a legitimate form of research activity *providing* certain criteria are met, and that Action Research offers a framework for specifying such criteria. Considering these criteria in relation to my research methods may provide some support for my research methodology and the ultimate findings of the research. However, as I discussed in 2.3 (p45), my research methodology and research methods emerged during the research, which I intend to make visible through remainder of the thesis. It is therefore more appropriate to return to and evaluate my research methodology and research methods following my discussion of the research, which I shall do in the concluding chapter.

So, in this research, my intention has been to develop a critical artefact methodology by using design practice following a research methodology that draws on Action Research. My research also included a contextual review of relevant precedent to support this practical work. My intention is to interpret the features of existing theories and practices which support my understanding of a critical artefact methodology – features that justify the critical artefact methods I devise and suggest reasons for their operation.

I conducted my contextual review in two broad areas: design practices that employ tactics derived from Critical Theory, which I will discuss in chapter 4, and the use of artefacts as part of stakeholder participation in design activity, the subject of the next chapter.

3 Participation via artefacts

3.1 Introduction

At the end of chapter 1 I suggested some basic features of a critical artefact methodology (see 1.8, p29). This included positioning it within the paradigm of human-centred design and, as such, the use of activities to engage with stakeholders and inform the designer's understanding of their needs. To begin unpicking the nature of these engagement activities, in this chapter I will review existing approaches with similar means and ends – that is engaging with stakeholders as part of designing for those stakeholders.

Critical artefacts are central to the engagement activities in a critical artefact methodology. So I will also review two exemplar approaches that illustrate two distinct ways of using artefacts to engage with stakeholders – Ehn & Kyng's mock-ups and cultural probes as originally intended by Gaver et al.

Although I will begin a discussion of how the engagement activities inform the designer's understanding of stakeholder needs in this chapter, these ideas are developed more in chapter 6.

3.2 Participatory design

> *"Are there ways of designing jobs (and technologies to support jobs) to combine heightened productivity with human growth, challenge, and a high quality of work life for the people who hold those jobs?" Sarah Kuhn & Michael Muller (1993)*

Contemporary notions of participatory design (for example in HCI) have their roots in 1970s Scandinavian workplaces where the increasing industrial application of computing technology prompted concerns that people's work would be constrained, deskilled and devalued. A strong history of workplace democracy and trade union involvement within industry motivated the development of approaches that considered the interests of workers, as well as their employers, in the design of technical systems. Such approaches attracted international interest, particularly in North America where the Computer

Professionals for Social Responsibility (CPSR) was founded in 1981 (CPSR 2008). Numerous approaches with broadly similar aims have been developed since and are often discussed collectively as 'participatory design', although other terms such as "cooperative design" (Bødker et al. 1988, Greenbaum and Kyng 1991), "work-oriented design" (Ehn 1988), and "collective systems design" (Ehn and Badham 2002) are also used. These approaches are not limited to Scandinavia – Muller, Wildman and White's (1993) taxonomy of participatory design lists 19 out of the 22 approaches included as being developed or used outside Scandinavia (noting that they may have been developed or used in Scandinavia *as well*). Evidence of the continuing development of participatory design can be seen in the international growth of CPSR which has members in 26 countries and their biennial Participatory Design Conference which has been running since 1990.

The ethos of participatory design can be expressed in two beliefs: firstly that a technical system's stakeholders[24] have a democratic right to be included in its design and will benefit as a result; and secondly that including stakeholders in design activities results in better technical systems (for example more efficient, more usable, more profitable). Ehn (1993) refers to this as the political and technical features of participatory design. Participatory design aims to produce 'happier' (empowered, enabled, fulfilled) stakeholders *and* better products/productivity.

So, participatory design gives value to both human and operational improvement. If the design of technical systems for work is focussed solely on operational measures the systems produced could ignore factors that ensure people are happy and fulfilled in their work, the systems may also automate skills previously held, and valued, by those people. Participatory design instead seeks to design technical systems that provide stakeholders with better tools for doing their work – to utilise and enhance rather than replace their skills. Participatory design can also operate on several scales, affecting individual projects, companies or even national policies (although it is most commonly associated with the first level).

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[24] This is a similar use of the term stakeholder as discussed in 1.7 (p26), i.e. stakeholders in the sense of having a vested interest, which is not necessarily financial.

Participatory design, as described above, is most frequently associated with computer systems design, human-computer interaction (HCI) designers and researchers, and the area of research termed computer supported cooperative work (CSCW)[25]. It was originally focussed on design in the workplace – that is the design of systems for getting work done via both technology and processes. For example Büscher et al. (2004) describe working with a group of landscape architects on the design of computer systems to support their work, including features to support collaboration, multi-site working and outdoor site visits. To develop this system they used strategies such as getting the architects to work on actual landscape design projects using a prototype "design studio of the future" and having the architects use prototype products in their everyday practice (ibid.). In both situations the focus was on observing the architect's working practice, by getting them to actually 'work', and exploring how the technology could support this work.

The term participatory design is not restricted to computer supported work, although that is where it is applied frequently. As computer technology has become increasingly prevalent in people's everyday lives, the focus of participatory design has expanded from working practices to social practices in general – from appreciating stakeholders' '*work*' and designing technical systems to better support it, to stakeholders' participation to ensure what is designed for them meets their needs in *various* aspects of their lives.

Such participatory design approaches share several tenets:

- A focus on how people perform their practices, such as the social interactions that facilitate and evidence 'work being done' (particularly approaches related to ethnomethodology such as discussed in Button (2003);
- That human practices must be understood in context, via an engagement with people performing their practices in situ, such as workers (or, broadly, stakeholders in the work) doing work in workplaces;
- A view of stakeholders as experts in their own practices (e.g. their work) and therefore particularly well qualified to design for them; and

[25] Kensing and Blomberg (1998) discuss the common ground between participatory design and CSCW.

- A consequent view of designers not as experts, but rather technical consultants and facilitators;
- A holistic view of possible design solutions – which may be social/organisational, operational or technological;
- A reflexive approach – participatory designers are conscious of their own role in the design process.

(cf. descriptions of participatory design in Schuler and Namioka 1993, CPSR 2005, and Kensing and Blomberg 1998)

3.3 Co-design

Participatory design has been used to describe approaches used in architecture (Luck 2003) and industrial design. Discussion of stakeholder participation in these fields has occurred in parallel with, as well as been influenced by, the participatory design tradition in computer systems design – for example the Design Research Society organised a conference on design participation in 1971 (Cross 1972). Approaches in architecture and industrial design to some extent share the political and social features of participatory design as described above but also develop other aspects.

In the 1980s several projects were carried out under the term 'community architecture' where those directly affected by buildings were included in their design for socially beneficial ends – for example the involvement of residents in an apartment block's design or the involvement of local people in the design of their public library (Fowles 2000, Oberdorfer 1988). Community architecture meant buildings designed *by* and *for* the people who would use them, and as such closely parallels the political and technical features of participatory design – 'happier' people and better buildings. In the 1990s the emphasis shifted to environmental and ecological concerns (Fowles 2000), but participatory design features continued to be seen in architecture and industrial design where the term 'co-design' is now more widely used.

Although certain forms of co-design share traits with participatory design, co-design itself is a broad and varied field (not all co-design is participatory design and vice-versa). The distinction between participatory design and co-

design is blurred, but there are elements where they differ. A 2000 conference on co-design recognised that the 'co' in co-design could stand for collaborative, cooperative or concurrent (amongst other things) (Scrivener, Ball and Woodcock 2000, p.v) – for example in computer science, co-design is often applied to the *concurrent* design of hardware and software[26]. Co-design in the *collaborative/cooperative* sense can refer to any design activity conducted by a group of individuals with different roles. This can mean co-design between designers and other professionals (such as designers and engineers) as well as between designers and users/stakeholders. However it is the latter sense of co-design (engagement with stakeholders in designing for those stakeholders) that is of relevance to my discussion of participation here (although this is of a particular form in my critical artefact methods, as I will discuss in 3.4, p56).

Sanders & Stapper (2008) take the view that co-design is a specific instance of co-creation – "any act of collective creativity" – namely co-creation within a design process. Although this interpretation may be particular to Sanders & Stapper, it does typify the purpose of stakeholder participation in co-design – to influence what is designed. As such, co-design may be more focussed towards the technical feature of participatory design (making better products) than its political feature (empowering/enabling/fulfilling those participating)[27].

> *"Co-designing is essentially design with, for and about users." (Scrivener, Ball and Woodcock 2000, p129)*

3.4 Comparing participatory elements

Although I have given an overview of participatory design and co-design above, my aim in reviewing them is to unpick the nature of stakeholder participation within them (as approaches that use participation as part of designing for those stakeholders). Answering two questions, with examples, suggests how this participation can be characterised within participatory design

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[26] Such as discussed at the CODES conference: http://www.ida.liu.se/conferences/codes/ (last accessed 10/10/2008).

[27] Although it could be argued that, in designing products better suited to their needs, stakeholders' lives *are* improved, this is not the increase in stakeholders' personal value via democratic participation as espoused by participatory design.

and co-design, and allows me to position a critical artefact methodology in relation to this characterisation:

1. What is the result of stakeholder participation?
2. Who does the designing?

As I will discuss below, there are broadly two possible answers for each question. However it is too simplistic to suggest that approaches fall into one or other of these categories, for instance a participatory design project might use collaborative design tasks within a semi-structured interview that results in both an understanding of stakeholder needs and design proposals. So I suggest answers to these questions are best considered as positions along continua, with the two possibilities at each end. Figure 3.1 illustrates these continua and plots example approaches and a critical artefact methodology on them.

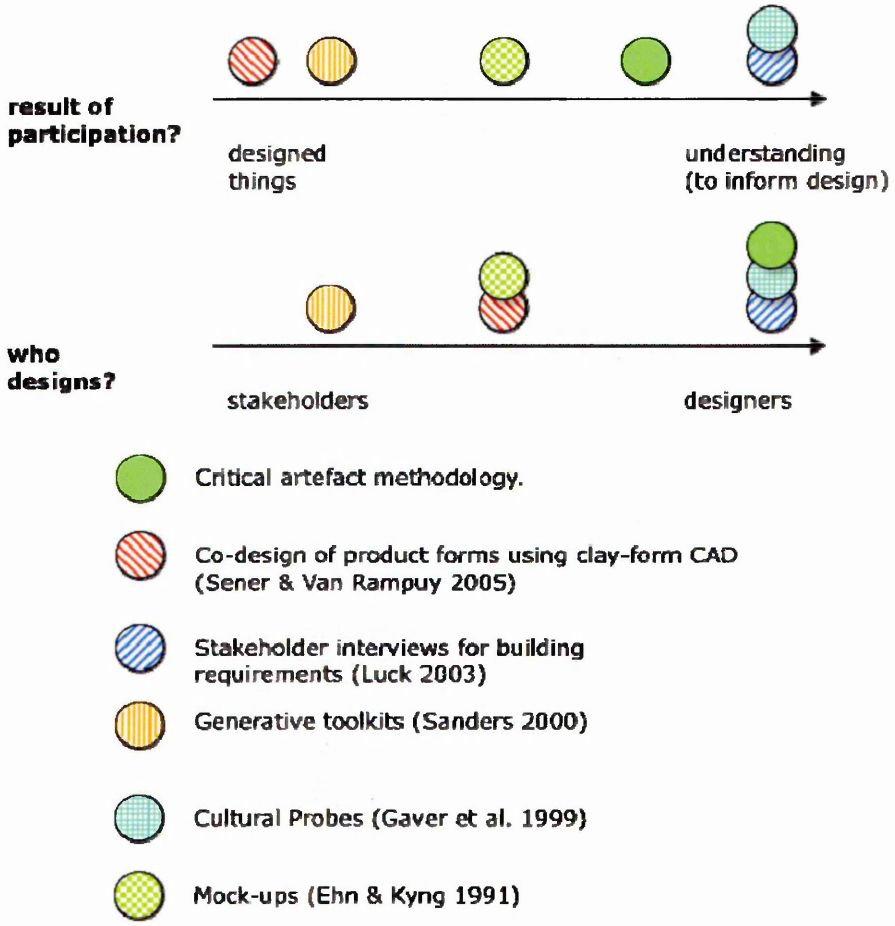

Figure 3.1 comparing participatory elements

The first question relates to the explicit intention of the stakeholder engagement activities. Precedent suggests this may be in two directions in

relation to the design process: the creation of 'designed things' or the development of understanding (that then informs design). Sener & Van Rampuy (2005) describe an example of the former where stakeholders and designers used a 'clay-form' CAD modelling system to collaboratively design product forms. Luck (2003) describes an example of the latter where disabled people were interviewed to understand their requirements for a new "multi-functional building".

So I suggest that 'designed things' and 'understanding' are two ends of the continuum of possible results from participation activities. Co-design approaches tend to be focussed more towards the co-creation end of the continuum – the creation of designed things. Participatory design approaches are spread across the continuum, although in HCI more broadly there are a number of approaches that use techniques such as ethnography to develop understanding to inform design (e.g. Blomberg et al. 1993).

The second question asks who does the designing within a project as a whole, i.e. not just within the participatory activities that are a part of it. This might be stakeholders or designers[28], but could also be a combination of both so a continuum is again appropriate for positioning participatory approaches. Where 'understanding' is the result of the participation (as discussed above), it is the designers who do the designing – such as the example of Luck's work above. However when 'designed things' are the result of the participation, the second question differentiates such approaches further.

An example towards the stakeholder-end of the continuum is the use of "generative tools" described by Sanders (2000) – stakeholders use collections of "tools" (such as simple 2-D/3-D shapes, photographs, sketches and writing/drawing tools) to build future products and envisage potential situations *alone*. However in the project described by Sener & Van Rampuy (2005), designers and stakeholders used the CAD system to design *together*, and as such it may be halfway along the continuum.

[28] Designers here refers to anyone designing something in a professional capacity (they might be designers, engineers, anthropologists etc.), to make a distinction from stakeholders who design and so could therefore be said to be designers in that instance.

Generally, if the result of participation is 'designed things', stakeholders are involved in their design (with or without designers). This is characteristic of co-design approaches in the sense of co-creation described earlier. It also re-focuses the roles of the designer and stakeholders – stakeholders become the experts and designers become the facilitators and technical consultants in the co-creation (Schuler & Namioka 1993).

Answering these two questions in relation to a critical artefact methodology clarifies how it relates to other approaches where stakeholder engagement is part of a design process. The conceptual designs in a critical artefact methodology are devised by the designer; hence it sits on the 'designers' end of the second continuum. In this approach, as outlined in 1.8 (p29), the designer's participation in discussion workshops somehow builds their understanding of stakeholder needs which is developed and expressed through the design of artefacts (conceptual designs). A critical artefact methodology therefore sits towards the 'understanding' end of the first continuum but could also be said to have a 'designed things' element. The intended result of the designers' participation is a (tacit) understanding of stakeholder needs. However the discussion workshops centre on the presentation of conceptual designs, and stakeholders' comments on these designs influences the designer's creation of subsequent conceptual designs. So what collaborative design element is present is indirect and subtle.

A critical artefact methodology is then similar to approaches where stakeholder participation *informs* design activity, rather than *is* the design activity. It could be said to be co-design in the collaborative design sense but not co-creation sense. It is more appropriate to describe it as participatory design, where a common strategy is participation to inform design. However, in such participatory design approaches, and unlike a critical artefact methodology, it is rarely designers *alone* who participate in activities with stakeholders. In particular, professionals from disciplines focussed on explanation (social scientists, psychologists etc.) participate with the aim of documenting the understanding gained from the activities. When designers act as participant-observers there can be contention about any understanding they claim, which I will discuss further in 3.7 (p74) below.

Finally a critical artefact methodology aims to produce innovative product ideas that are human-centred – products that fundamentally improve human-life[29]. It could therefore be said to satisfy both Ehn's political and technical features of participatory design, the former of which is often less obvious in co-design.

3.5 Artefacts as engagement

A critical artefact methodology uses conceptual designs to engage with stakeholders. This prompts the questions: what other approaches use artefacts to engage with stakeholders, what is the role of the artefacts within them, and how could a critical artefact methodology be described in relation to them?

Two particular approaches suggest particular roles for artefacts as part of stakeholder engagement activities and are therefore worth unpicking in detail: mock-ups as described by Ehn & Kyng and cultural probes as originally posited by Gaver et al.

3.5.1 Ehn & Kyng's mock-ups

Scandinavian computer science researchers Pelle Ehn and Morten Kyng reached an obstacle that effectively halted their project to investigate "the future of computer-supported newspaper production" (1991, p169). Their UTOPIA project aimed to include journalists and typographers in the participatory design of new computer-based systems for newspaper layout in 1982 when such technology was in early development and not in widespread use. As the "professional designers" (ibid.) in the project, Ehn & Kyng had produced a series of detailed system descriptions for the stakeholders (journalists and typographers) to engage with. However the stakeholders could not understand these system descriptions. They could not relate them to familiar work situations and as such they could not see their role in the use of such systems. The activity of designing stalled because the stakeholders could

[29] See my discussion of human-centred design in 1.7 (p26). On a personal note (as discussed in 1.1.1, p11), I came to this research following a career in media and internet technologies where the predominant view was of the world as a static entity, quantifiable via technical requirements. Throughout this research, my personal sympathies have moved from this technology-led agenda towards a socially-led agenda that sees people and their social practices as dynamic.

no longer participate in it; they could not use the system descriptions to work out possible solutions.

Figure 3.2 a low fidelity mock-up of a laser printer
(image courtesy of Pelle Ehn)

Ehn & Kyng overcame this obstacle by using "mock-ups"– simulations of technical artefacts initially using basic materials and existing objects (such as a cardboard box with a label saying "Desk Top Laser Printer" stuck on it, Figure 3.2) – to enable stakeholders to "play out" work situations (ibid.). The activity of designing could then continue as the users could creatively engage with how a computer-supported page layout system might work by 'pretending' to use it rather than getting stuck comprehending the technical feasibility and operation of its parts. Ehn & Kyng wanted their stakeholders to move from simply evaluating design proposals to participating in the designing itself. Stakeholders' hands-on experience provided the environment for them to develop new designs, and the mock-ups enabled the creation of novel settings for this experience: " 'hands on the future' as opposed to 'eyes on a system description' " (ibid., p181).

But this approach is not simply a case of making mock-ups of novel technological systems out of cardboard and getting users to 'make believe' with them. Ehn & Kyng identify key characteristics of their mock-ups that enable them to work. Firstly the stakeholders are comfortable pretending a cardboard

box is a laser printer (say) because it is part of a "design language game" (ibid.) that has a family resemblance to other language games they play. Ehn & Kyng draw from Wittgenstein's ideas about language games here – that we all play such language games, we can participate in human activity because we all know the unwritten rules of that activity. If one stakeholder asks another to "pass me the proof from the laser printer" she would be unlikely to say "don't be daft, that's a cardboard box" as she would be going against the unwritten rules of the 'game'. The 'game' in this example is the conversations and activities that *might* occur around a laser printer that, crucially, have a family resemblance to the conversations and activities that *do* occur around a proofing machine. The stakeholders know the unwritten rules of this 'game' because they are experienced journalists and typographers and recognise the similarity to the existing language games associated with traditional proofing machines.

Secondly Ehn & Kyng suggest that it is important that mock-ups are, to use their term, "understandable" as not being the 'real thing'. From their construction it is clear that they are simple 'placeholders' for technical artefacts rather than physical or functional models of them. Using a matchbox as a mock-up of a computer mouse, stakeholders would not question why it was rectangular, yellow and had a strip of sandpaper on the side. The stakeholders know it is a matchbox 'standing in' for something else in the game they are playing. Likewise if a drawing simulating a graphics display falls off the wall, stakeholders don't think the graphics display is broken, they realise this is just a problem with sticking paper on a dusty wall.

Mock-ups are props to enable stakeholders to enact existing and potential practices (their working practices in the UTOPIA project). For Ehn & Kyng, this simulation of practices and the subsequent modification of props and practices is where the participating designers (stakeholders and 'professional designers') do the actual designing (although it also provides insights for non-participatory designing as I will note below). So, this approach is co-creation as discussed previously.

Ehn & Kyng suggest that it is the use of basic materials such as cardboard, paper and hand drawn text and images that make the mock-ups understandable. They note a significant challenge in using more advanced

resources such as slide projectors and computers to mock-up more complex simulations is that the mock-ups lose their 'understandability'. I take this further and suggest that it is not the basic nature of the raw materials that is the defining characteristic; rather it is that the materials include recognisable objects not being used as themselves. Sticking a drawing of a QWERTY layout on a pizza box as a keyboard mock-up is not likely to prompt participants to ask why it is square and smells of stale cheese. However cutting a pizza box to a specific size and colouring all the number keys blue may prompt stakeholders to challenge its physical appearance.

Key to Ehn & Kyng's participatory design approach is stakeholders' engagement in practices rather than evaluation of proposals. They use Heidegger's terminology to unpick types of engagement and suggest which is most useful. When their stakeholders used the mock-ups to 'play out' practices, the mock-ups were not present as objects in themselves, rather, to use Heidegger's terms, *zuhanden* (ready-to-hand) in the activities they envisage. The stakeholders' engagement is with the activities themselves rather than detached reflections over them. However Ehn & Kyng note that occasionally the process breaks down and the mock-ups become *vorhanden* (present-at-hand) to the stakeholders – a visible collection of objects: cardboard, paper, matchboxes etc. They made use of these breakdowns as opportunities for them as "professional designers" to reflect on the appropriateness of their designs. For example to question whether a mouse is an adequate replacement for a typographer's knife?

Ehn & Kyng feel the ready-to-hand type of engagement is more useful in the participatory aspects of the design activity. Their approach requires the absorption in 'playing out' practices that such engagement provides. When stakeholders start seeing the mock-ups as a collection of present-at-hand objects, that absorption is lost and the designing halts. However they suggest such breakdowns can be useful in informing the non-participatory aspects of the design activity. They prompt detached reflections of what has been mocked-up grounded in practical experience of stakeholders' attempts at and expectations of ready-to-hand use of those mock-ups.

So, to summarise Ehn & Kyng's use of low fidelity mock-ups[30] (my term): they enable the participatory design of future systems via 'playing out' the practices those systems will support. In order to do this the mock-ups should suggest situations that have a family resemblance to situations familiar to the stakeholders – the 'design game' should resemble other language games familiar to the stakeholders. The mock-ups' nature as being 'not real' should be clearly understandable from their manner of construction. One way of doing this is to use recognisable objects that are obviously 'standing in' for something else – a cardboard box as a laser printer, a margarine carton as a remote control. Consequently the stakeholders become absorbed in 'using' the mock-ups to enact the activities associated with the design context; the mock-ups become *zuhanden* (ready-to-hand). It is the stakeholders' 'playing out' of practices and collaborative modification of those practices and the mock-ups of systems that support them where the designing happens in this approach.

There are obvious practical reasons for making mock-ups out of basic materials. They are cheap and quick to make, saving development resources and time. They lend themselves to easy modification with no pre-requisites for technical knowledge. And they are 'fun' to use. But Ehn & Kyng show there are other, more fundamental reasons that make such basic mock-ups valuable tools for participatory design. They enable stakeholders to imagine future situations and participate in designing for them via hands-on experience.

3.5.2 Cultural probes

Bill Gaver and Tony Dunne[31] from the Royal College of Art and Elena Pacenti from the Domus Academy participated in a project "exploring technologies to increase the presence of the elderly in their local communities" (1999, p24) working with groups of older people in Sweden, the Netherlands and Italy. During the first year of this two year project the designers intended to "[open] a space of possible designs" (ibid., p24) which would then inform the design of

[30] Ehn & Kyng refer to other, more complex, mock-ups in the cited reference. So in this term I am referring to those made with basic materials. They also never use the term low fidelity prototype. I will discuss how mock-ups might be differentiated from prototypes further below (3.6, p69).

[31] This is the same Dunne whose idea of critical design I will discuss in chapter 4.

prototypes for testing in the communities in the second year. In the first stage of the project, the designers' wanted a method of exploring what they might design that, whilst grounding the designs in an understanding of the communities, reflected a broader view of how the designs could support those communities – designs as providing "opportunities to discover new pleasures, new forms of sociability, and new cultural forms" rather than simply as "solutions for user needs" (ibid., p25). Gaver, Dunne and Pacenti developed the 'cultural probes' approach to achieve this. Their method has been subsequently adopted and adapted within HCI research (often for more reductive enquiries)[32], but it is approaches adhering to their original intentions that are relevant to my discussion and will be described here.

Cultural probes are collections of varied objects (such as maps, postcards, disposable film cameras and booklets) with instructions for their use, left with groups of stakeholders for them to use and return (via post) over time. Designers devise probes particularly for the stakeholders they are working with, to ensure they are engaging and enjoyable to use and open-ended enough for stakeholders to appropriate their use. The probe instructions, rather than specifically requesting their needs, encourage stakeholders to re-frame and re-appraise their everyday lives in novel, ambiguous or absurd terms. For example in Gaver et al.'s above project the probes included a local map with instructions to mark where stakeholders would go to "meet people/be alone/daydream", a disposable camera with requested subjects such as "your home/something desirable/something boring" printed on the back, and postcards with questions such as "tell us a piece of advice" and "what place does art have in your life?" (ibid.). Once returned, the information contained in the cultural probes is used by designers to develop their understanding of the context being designed for.

Designers interpret the probe returns and express their own understanding via further design work, which continues the 'conversation' with the stakeholders. Gaver et al. describe the purpose of cultural probes is not to gain an objective view of stakeholders' needs rather "a more impressionistic

[32] Boehner et al. 2007 and Graham et al. 2007 discuss these adoptions and adaptations, and will be referred to below.

account of their beliefs and desires, their aesthetic preferences and cultural concerns" (ibid., p25). Designers' engagement with the returned probes is intentionally subjective – it is to inspire the design that follows rather than to identify specific needs to be directly translated into designs. Crucially this engagement – the 'processing' of the probe returns – includes producing designs to explore the facets that appear. For example in the above project, Gaver and Dunne gained an impression of the "different characters" of the three communities which they responded to in three different design proposals, such as the Dutch community as a "strong community in a dangerous area" for which they proposed a network of computer displays for older people to communicate their values and attitudes about their culture (ibid., p27).

The two questions I presented in 3.4 above (p56) further characterise the cultural probes approach (cultural probes are also plotted in Figure 3.1). Firstly the stakeholders' participation results in 'understanding' – the inspiration for later design activity – rather than 'designed things' directly. And as such, it is the designers, not the stakeholders, who do the designing. The purpose of cultural probes is a *broad* exploration of what might be designed. Gaver et al. suggest that stakeholders' existing understanding of their everyday lives and needs would limit this breadth if stakeholders were to explicitly direct what might be designed (ibid.)[33]. Stakeholders as co-designers could constrain the designs produced, which is counter to the open exploration of possibilities that the cultural probes approach intends. So, although it is participatory design, the cultural probes approach does not include co-creation.

The strategy of cultural probes then is to provoke stakeholders to consider new perspectives on their everyday lives, which in turn broadens their view of possibilities for what might be designed. Cultural probes prompt reflection in two respects. Firstly in stakeholders' understanding of their lives (and consequently of what is possible) and secondly, via the returned probes, in designers' understanding of the stakeholders' lives.

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[33] Another instance of 'designing better horses' as discussed in chapter 1 (p10).

In the above example Gaver et al. note that the older people learnt from using the cultural probes: "They provoked the groups to think about the roles they play and the pleasures they experience, hinting to them that our designs might suggest new roles and new experiences" (ibid., p29). So, their use of probes in the first stage of the project also 'primed' the stakeholders for their evaluation of the design ideas presented in the second stage.

The approach Gaver et al. set out in 1999 has become widely adopted in HCI and design[34] but it has suffered from misappropriation. In 2004 Gaver published a response to a "strong tendency to rationalize the Probes" (2004, p53) – rather than applying cultural probes in open, exploratory enquiries, some researchers had designed cultural probes to ask specific questions and provide particular, comprehensible results. This misappropriation misses a fundamental premise of cultural probes – that designers' and stakeholders' existing understanding of a context is limited, they have a restricted view of what is possible (such as social practices and acceptable roles for technology within them). Cultural probes are a way of broadening these views using "uncertainty, play, exploration, and subjective interpretation as ways of dealing with those limits" (ibid., p53-54). Cultural probes are a way of exploring 'uncharted territory'. Gaver gives an example of a project exploring new technologies for the home, where previous research tended to propagate stereotypes such as 'home equals family' (ibid.). To disrupt pre-conceptions about the home, the project's cultural probes included a disposable camera with requested photographs such as "something you'd like to get rid of" and "the spiritual centre of your home".

Gaver et al. also note that returned cultural probes resist analytic and objective interpretation. They reflect several layers of influence: probe creation, interpretation by stakeholders, probe use, and interpretation by designers. For example a comparison of two photographs resulting from a probe request for "the spiritual centre of the home" is confounded by each stakeholder/photographer's interpretation and compositional skills and the

[34] The ACM Digital Library notes 117 papers citing the original 1999 paper (as of 17/10/2008, at http://portal.acm.org/dl.cfm), for example projects employing the cultural probes approach see Lindström et al. 2006, Nilsson, Johansson and Håkansson 2003, Wyeth and Diercke 2006.

designer/viewer's pre-conceptions. The cultural probes approach utilises these subjective influences – recognising that it is impossible for designers to completely appreciate what it is like to *be* the stakeholders, so they must see stakeholders' lives in terms of their own experiences; an empathic engagement with the probe returns. Cultural probes enable designers to develop a 'feel' for stakeholders' lives rather than an explicit description of them.

Gaver et al. note a tension between probe returns that confront designers with stakeholders' experiences that are different to their own, and designers' interpretation of these returns that relies on them empathising with stakeholders' experiences in relation to their own. They suggest this situation is valuable for open, exploratory design activities as it provides new perspectives whilst not closing off the designers' own ideas, interests and understandings. They suggest analysing probe returns as 'raw data', as might be said of 'scientific approaches' (their term), could "blunt the contact" (ibid.) the designers have with stakeholders – something is 'lost in translation'.

Boehner et al. (2007) have unpicked the misappropriation of the cultural probes approach in HCI further. From a review of around 90 HCI papers, they observed a common tendency to appropriate cultural probes as objective data collection methods without recognising their underlying methodology which embodies an alternative view of knowledge production. In this view, knowledge is produced as part of a dialogical process between designers and stakeholders, an ongoing process of subjective interpretation. The misappropriated approaches suggest an objective process of closing down to a 'correct' understanding of stakeholders' experiences. The latter view denies the agency of both stakeholders and designers in interpreting any understanding – each have their own subjective interpretations of the others' experiences and expectations. Designers' inherent subjectivity in interpreting ambiguous probes (and stakeholders' use of them) is incompatible with closed interpretation (the tension Gaver et al. refer to, as discussed above) – there is no 'correct' interpretation but there is the potential for insights that break pre-conceptions. Cultural probes, then, are only appropriate where the aim is to keep the enquiry open and exploratory, not as a way of clarifying 'user needs' or final design features – probes as inspiration not probes for information (ibid.).

Graham et al. (2007) have also discussed cultural probes' use, noting that cultural probes have been used by different research communities who "often have different ideas of what 'design' actually is and who does it" (ibid., p30), but their focus is on how cultural probes can be seen to work in practical terms. They suggest several themes that characterise what cultural probes do and how they do it with reference to their experiences employing cultural probes in two projects. These themes correlate with the aspects of cultural probes I discuss above, including that: probes humanise, probes use uncertainty, probes inspire, probes engender interpretation, and probes provoke – although they suggest this last element is "probably overstated" (ibid., p33-34). Graham et al. also agree that cultural probes not only enable stakeholders and designers to understand each other, they also broaden their understanding of themselves:

> *"[..] our respondents uncover and reveal [..] aspects of their everyday lives, but not just to us, but to themselves: it is enquired into and 'discovered' by them as much as by researchers and designers." (ibid., p35)*

3.6 Comparing roles of artefacts

Mock-ups and cultural probes are exemplary demonstrations of the use of artefacts to engage with stakeholders. Characterising the roles of artefacts in these approaches allows me to make comparisons between them, the roles of artefacts in a critical artefact methodology, and, more widely, the roles of any artefact produced or used with a design process (i.e. not just restricted to engagement with stakeholders). One of the most important and widely discussed artefacts produced and used in design processes is the prototype. So to begin my characterisation of artefacts used in stakeholder engagement activities, I will consider how others have categorised prototypes.

In discussing the use of prototypes in software development at Apple computers, Houde & Hill (1997) suggest three classes of prototype: those that prototype the role of the product (to ascertain whether the role is suitable), those that prototype the implementation of the product (to work out how it is technically constructed), and those that prototype the "look and feel" of the product (to evaluate its appearance and functionality). Buchenau & Fulton-Suri

(2000) extend this idea with "experience prototypes" that encourage evaluation of what it would be like to experience a product. When presenting product prototypes to clients, the design consultancy IDEO have clarified prototypes' purpose using the terms "looks like", "works like", "behaves like" and "feels like"[35] (Pullin 2007). However none of these categorisations appear to capture the essence of how mock-ups and cultural probes are intended to be used.

A classification of computer software prototypes arrived at by the programme committee of the 1983 Working Conference on Prototyping offers some insight (Floyd 1984). They suggested three classes of "prototyping" – activities employing prototypes for particular ends. Although the committee suggested these classes in relation to computer software development, two of them adequately describe the use of prototypes in design more widely[36]:

> *"prototyping for exploration, where the emphasis is on clarifying requirements and desirable features of the target system and where alternative possibilities for solutions are discussed,*
>
> *prototyping for experimentation, where the emphasis is on determining the adequacy of a proposed solution before investing in large-scale implementation of the target system." (ibid.)*

Replacing 'target system' with 'end product' may clarify the similarity, and I suggest that 'testing' is a better term than 'experimentation' – the latter term suggests an open enquiry whereas Floyd discusses it in relation to the "experimental use" (ibid.) of software to test its suitability, a more closed enquiry. Re-phrasing then suggests two categories of prototype:

- exploratory prototypes – prototypes used to work out what stakeholder needs the end product should respond to and what the features of the end product might be;
- test prototypes – prototypes used to check the suitability of product features.

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[35] Referring to tactile properties, the use of finished materials rather than emotional engagement.

[36] The third class, "prototyping for evolution", is more specific to software development, dealing with ongoing modification of software as requirements change. Floyd notes that some authors question the term prototyping in this respect and suggest "development in versions 'versioning' " instead (1984).

Floyd recognises the distinction between these two types is blurred, so, as with the participatory aspects discussed above, I suggest it may be better to consider 'exploration' and 'testing' as two ends of a continuum of activities or, more specifically, the designers' *intention* for those activities. In this sense the schemes described by Houde & Hill, Buchenau & Fulton-Suri and Pullin are all towards the 'testing' end of the continuum – their differences relate to *what* is being tested (particular aspects of products), although in some cases they may prompt a more open exploration of these aspects.

Describing mock-ups as 'exploratory prototypes' would still not sufficiently describe them, and cultural probes bear no resemblance to prototypes of any form. The problem is the application of the term 'prototype'[37]. A dictionary definition of the noun prototype offers:

> *"1. a first form of something from which other forms are developed or copied*
>
> *2. a typical example of something" (Oxford University Press 2002)*

In these terms a prototype implies an appreciation of the design activity's destination or direction – the prototype is either a 'first attempt' at a final product or somehow typifies a final product. This is not true of cultural probes where there is no intent to suggest the final product, and only partially true of mock-ups where the focus is on exploring practices rather than products. Another continuum is therefore appropriate, with artefacts intended to be 'prototypical' at one end and artefacts intended to be 'provocative' at the other end. This provocation may be towards intellectual reflection (as with cultural probes) or towards enacting practices (as with mock-ups).

Figure 3.3 plots mock-ups, cultural probes and prototypes on the two continua described above. Plotting a critical artefact methodology as a single entity on these continua is difficult as the roles of the artefacts used in the discussion workshops changes with each iteration. In the earlier workshops, the critical artefacts, like cultural probes, are intended to provoke reflection. However as the designers' understanding develops through subsequent

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[37] Dunne also discusses the limitations of the term prototype as applied to the products of critical design, preferring the term "geno-type" (1999) – I will discuss this further in chapter 4, next.

workshops, the artefacts become more 'prototypical' – they begin to express potential solutions to stakeholders' needs. Hence a critical artefact methodology is plotted on the second continuum as a progression from the provocative end (with the initial critical artefacts) towards the prototypical end (with subsequent artefacts); and similarly on the first continuum artefacts progress from exploration towards testing.

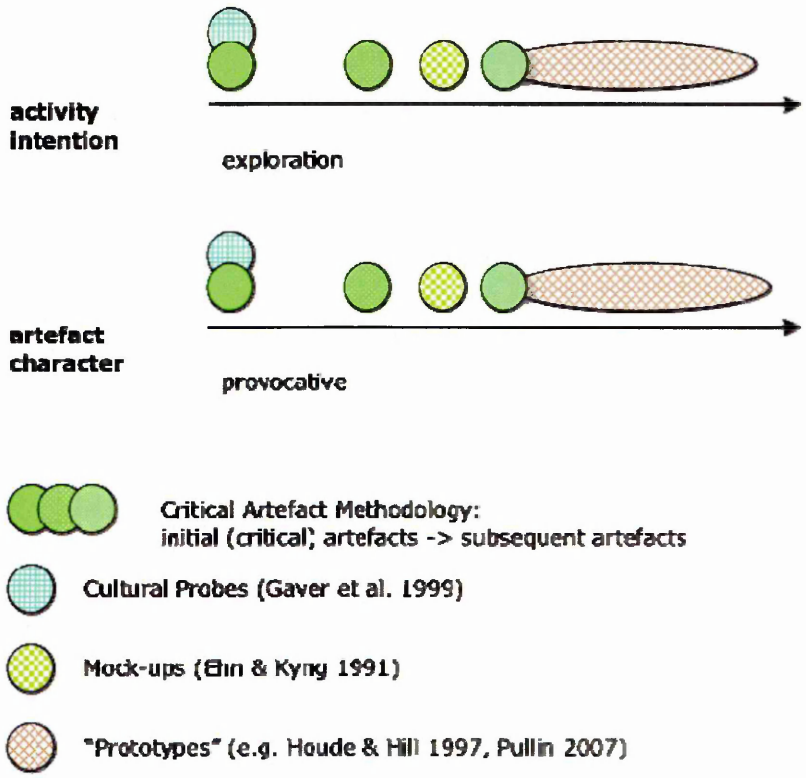

Figure 3.3 artefact intention and character

Another way of considering the artefacts' roles in stakeholder engagement activities is to classify *how* stakeholders engage with the artefacts. Ehn & Kyng's application of Heidegger's concepts of ready-to-hand and present-at-hand is useful here: stakeholders might directly evaluate an artefact's form and function – in which case the artefact is present-at-hand to them; or stakeholders might use an artefact to do something (and make a judgement of this activity) – in which case the artefact is ready-to-hand to them. Again a continuum is more appropriate, in which case mock-ups would be towards the ready-to-hand end and 'prototypes' towards the present-at-hand end. But this scale does not completely capture the sense of how stakeholders engage with

cultural probes. Stakeholders use cultural probes to express their beliefs and experiences, which makes them ready-to-hand in one sense, but also, through their use of the probes, they question and reflect upon these beliefs and experiences. So, I suggest a third option for stakeholder engagement is critical reflection[38].

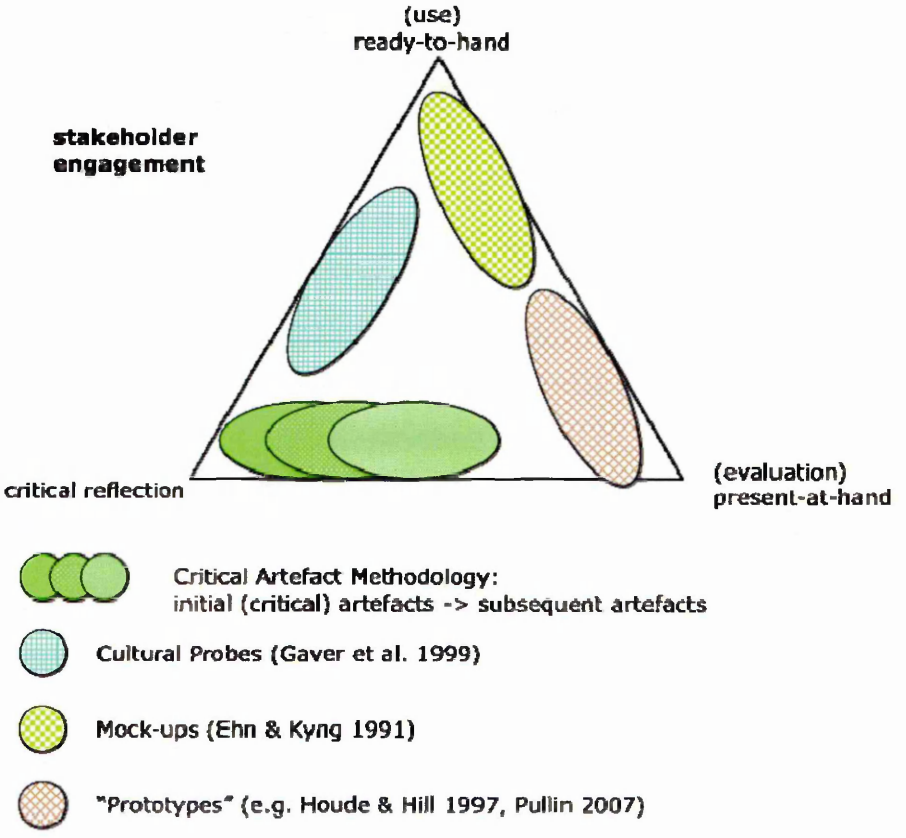

Figure 3.4 stakeholder engagement with artefacts

This provides a three-way continuum, which is illustrated in Figure 3.4. Mock-ups and 'prototypes' are plotted as discussed above. Stakeholders engage with cultural probes via both ready-to-hand use and critical reflection. For a critical artefact methodology, as the intention of the participation progresses from exploration towards testing with workshop iterations the nature of stakeholder engagement best suited to these types of enquiry also changes: from critical reflection towards present-at-hand evaluation[39]. This change in engagement is afforded by the progression of artefact character from

[38] The nature of this critical reflection is discussed in detail in the next chapter (4).
[39] The discussion workshop setting makes ready-to-hand use seem unlikely – stakeholders are more likely to discuss artefacts in a group than use them.

provocative (critical artefacts) towards prototypical (subsequent artefacts) as the designers' understanding develops. Also these artefacts do not 'stand in' for the 'real thing', as Ehn & Kyng's mock-ups do, and therefore need not be "understandable" in the same sense (1991).

So, in the scheme I have laid out above I am not differentiating prototypes, mock-ups and probes as distinct artefact roles. Rather I suggest that artefact roles can be characterised according to their intended use (from exploratory to testing), character (provocative to prototypical) and the manner in which stakeholders engage with them (ready-to-hand, present-at-hand, critical reflection). In this scheme a 'prototype' (as described by Houde & Hill) is a 'prototypical artefact', intended for testing, that stakeholders evaluate directly and/or use (to evaluate). A critical artefact methodology uses a progression of artefacts: from provocative critical artefacts intended for exploration via critical reflection towards prototypical artefacts intended for testing via stakeholder evaluation.

3.7 Participant-observation and design

3.7.1 Ethnography and design

> *"Ethnography has been so intuitively appealing to designers (and their clients) because it promises to reveal a whole new dimension of 'the user'. It investigates, not just what consumers say they do, but what they actually do." (Wasson 2000)*

Ethnography is a methodology that originally arose within Anthropology. A researcher using ethnography aims to produce descriptions of people's practices and interpretations of their meaning ('ethnographies') by becoming involved in their everyday activities (Blomberg et al. 1993). Ethnographies can provide designers with valuable insights into the perspectives and experiences of those they are designing for – what people do and why they do it in their own terms. Consequently ethnographic methods have been used within design processes from the 1980s and, in less explicit forms, earlier (Wasson 2000).

However 'traditional' ethnography is often seen as difficult to integrate with design processes. Hughes et al. (1995) note that ethnography is a "prolonged activity" involving one or more immersions over several years, and

produces findings that are often long and discursive; as such it seems incompatible with focussed, deadline-driven design activity. As a result of this several forms of ethnography have developed that are more targeted to serve design.

Salvador, Bell & Anderson (1999) describe their work as: "design ethnography [which] focuses on the broad patterns of everyday life that are important and relevant specifically for the conception, design, and development of new products and services" (p36). They recognise that, unlike 'traditional' ethnography, their field trips are necessarily brief and require a more flexible approach using several methods to develop their understanding.

Hughes et al. (1995) developed an approach they term "quick and dirty" ethnography, "where fieldworkers undertook short focused studies to quickly gain a general picture of the setting" (p61). Instead of attempting a comprehensive understanding of a context, their approach focuses on the portions of it they determine important in informing design.

Millen (2000) offers "rapid ethnography" as a 'telephoto' view alternative to the 'wide-angle' view provided by ('traditional') ethnography. Millen suggests rapid ethnography can provide valuable insights in a restricted time by: narrowing the area of interest before entering the field; careful selection of "key informants" (ibid.) within the field; and quicker collaborative analysis of observations in multi-person teams using computer-based tools.

Ethnographic methods tailored to serve design are used within industry as well as academia. Fulton Suri & Gibbs Howard (2006) have termed such approaches "corporate ethnography" and demonstrated their application in projects undertaken by design consultancy IDEO. There are also specialist agencies that conduct ethnographic studies for manufacturers to aid product development and evaluation, such as Naked Eye (2009).

The various 'focussed' ethnographic methods discussed above use 'fieldwork' (observation and participation in people's lives/'in the field') to produce an understanding that can inform design activity. They can be seen as a form of stakeholder participation to *inform* design activity as discussed previously (3.4, p56): the design of a product or system is informed by an understanding of its stakeholders that is developed via participation with and

observation of those stakeholders. A critical artefact methodology could be described as such an approach. However my critical artefact methods differ from ethnographic methods in two ways: who participates/observes and their aim in doing so, as I will discuss below.

3.7.2 Designers as participant-observers

In the ethnographic methods discussed above, it is generally social scientists that participate and observe to produce an understanding of stakeholders and their activities *for* designers. In a critical artefact methodology, the designer *directly* participates and observes. However designers have been criticised as not suitably qualified to produce an understanding of a context. This criticism centres on designers being biased in any understanding they develop through participation and observation.

Designers' instinctive focus on unravelling problems and devising potential solutions colours their participation. Their understanding is based on both the natural setting and the imagined settings their internally devised solutions suggest. Or their understanding is based on the artificial settings created by any design proposals introduced (either as ideas or artefacts). Designers then evaluate stakeholders' comments and actions according to whether they reveal problems, contribute to understanding of them or suggest criteria for their solution. Lebbon et al. suggest:

> *"Designers often are unable to distance themselves enough from their own preferences and habits, or from the design brief, to analyse the raw data as objectively as a researcher whose remit it is to bring a variety of results forward." (2003, p412).*

Button & Dourish question the understanding produced by designers claiming to practice ethnography as:

> *"[..] either a superficial overview of the setting, lacking any analytic sensibilities, or they are used as* post hoc *rationalizations for design decisions they have already been made [sic], or both." (2003, p 379, their* emphasis*)*

These views suggest designers do not participate/observe in such a way as to minimise their influence, and that any understanding they develop is biased, subjective and not formulated according to any formal analytic techniques –

"observational research should be done independently of design preconceptions" (Lebbon, Rouncefield and Viller 2003, p418). These are legitimate criticisms (and ones that social scientists trained in producing rigorous descriptions are less susceptible to) but they assume a particular relationship between the participation/observation and the design activity, and consequently a particular aim in conducting the participation/observation.

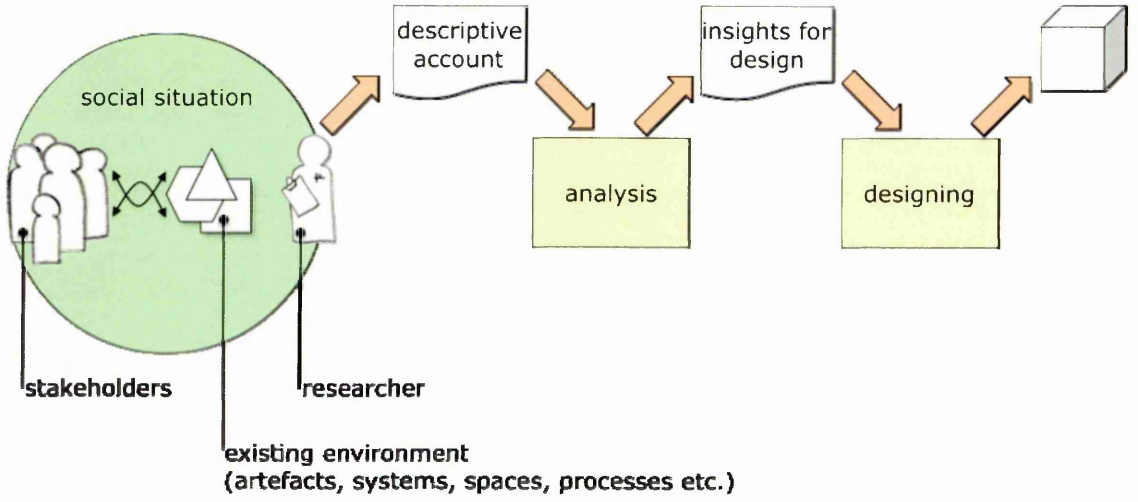

Figure 3.5 participation informing design, a 'social science' approach

Figure 3.5 illustrates the relationship between participation/observation and design as it is implied by a 'social science' approach. Social scientists participate in and observe a social situation – people ('stakeholders', say) interacting with each other and their existing environment (artefacts, systems, spaces, processes etc.) – and produce a descriptive account of that situation. This account is then analysed, via formally recognised means, to produce an understanding of the situation that can then inform the design activity. For example Button & Dourish (2003) describe an approach where a social situation is documented via an ethnography, which is then analysed using conversation analysis (informed by an ethnomethodological view of human interaction) to explicate the social practices taking place and inform the design of systems to support those practices. In such approaches participation/ observation informs design in a step-wise fashion, and the specific aim of the participation/observation activity is to produce a 'good' description of the

situation – one that attempts to be accurate, unbiased and objective (or acknowledging of its subjective influences).

The "contextmapping" approach developed by researchers at TU Delft (Sleeswijk Visser et al. 2005), like the cultural probes approach, embraces the idea that knowledge produced from observation/participation relies on iterative, subjective interpretation by stakeholders, researchers and designers. This approach seeks to communicate an understanding of a context – "all factors that influence the experience of a product use" (ibid., p121) – to designers based on participatory activities with stakeholders. The approach is split into stages including:

- the 'sensitization' of stakeholders using artefacts similar to (and inspired by) cultural probes to promote a reflective, engaged attitude to their own experiences prior to participatory activities;
- activities where stakeholders use generative tools to create collages, flowcharts and maps and then explain them to researchers to express their experiences (derived from Sanders' work, discussed above);
- analysis by participating researchers that is "not meant to support or reject existing hypotheses, but to explore the context, uncover unexpected directions, and widen the view of the design team." (ibid., p124);
- and communication of the understanding gained in forms that maintain its rich nature and are readily accessible to designers such as "personas, storyboards, scenarios or scripts" (ibid., p135); whilst
- qualifying the understanding of the context using a map metaphor with attendant caveats – remembering the territory is not the map, the map only as guide to further exploration, and the map as partial description with gaps to be filled via exploration.

Although ambiguity and open interpretation is used throughout context mapping, it is still a step-wise process (as illustrated in Figure 3.6) where the focus of the stakeholder participation activities is producing a descriptive account (albeit, an open to interpretation, subjective one). And the approach centres on researchers' rather than designers' participation in the stakeholder activities.

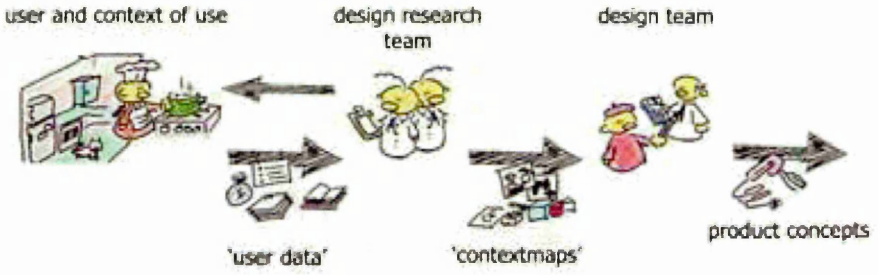

Figure 3.6 illustration of contextmapping
(taken from Stappers and Sleeswijk Visser 2006)

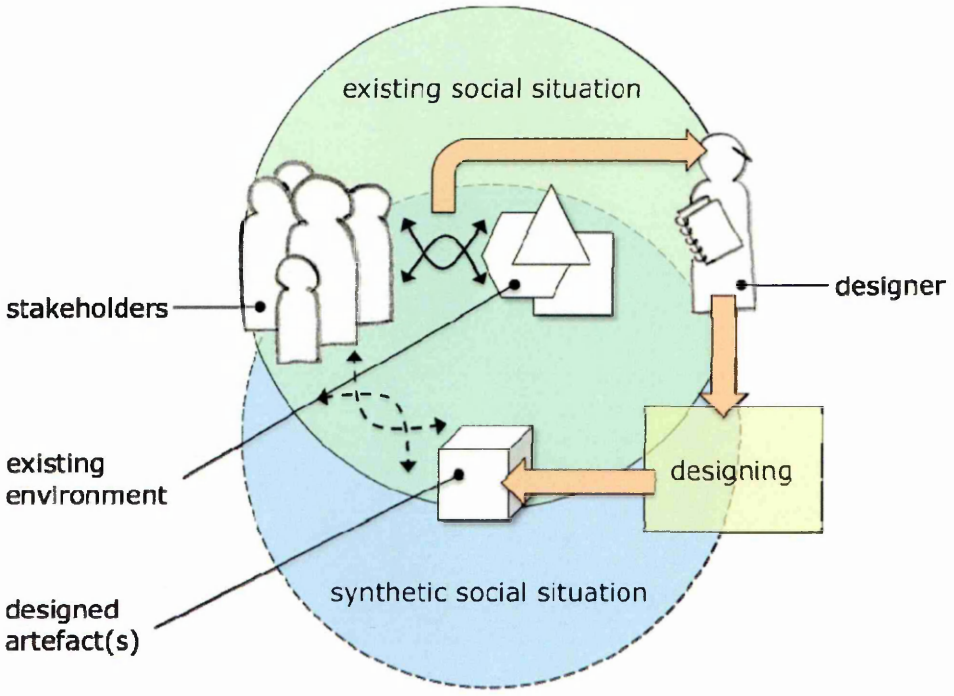

Figure 3.7 participation informing design, a 'design-led' approach

When designers participate in and observe social situations, their aim is not to produce a 'good' descriptive account of them[40], it is to produce 'better' design solutions – from more marketable/usable/profitable/efficient products to products that fundamentally improve stakeholders' lives. Blomberg et al. (1993) note that "Designers [..] are interested in understanding human behaviour insofar as it enables them to design artifacts better suited to the needs of the users" (p124). Figure 3.7 illustrates the relationship between

[40] Unless they are collaborating with social science researchers, in which case they could conceivably be said to be participating 'as researchers' rather than 'as designers'.

participation/observation and design as it is implied by this 'design-led' approach.

This diagram suggests two significant differences from the 'social science' approach. Firstly in the 'design-led' approach, the participation/observation informs the design activity in a holistic rather than step-wise manner. The designer develops their understanding through both participation/observation in social situations and the design of artefacts to develop a 'feel' for what would work in them (satisfy stakeholders' needs). Their attention to stakeholders' performance in/with their existing environment is focussed on the implications for the design of new artefacts for those stakeholders. The activities of participation/observation and designing are commingled and jointly inform the designer's understanding. This understanding is not necessarily made *explicit*, either as a description of the social situation or of insights for design, but is an *implicit* understanding that is developed and expressed through designing.

Secondly the designer is participating-in/observing social situations that may be synthetic. The stakeholders' environment is altered by the introduction of the resulting designed artefact(s) and their performances with this new environment may differ from, but overlap with, their existing performances. So, the implicit understanding the designer gains is in respect to both the existing social situation and the synthetic social situations afforded by any artefacts they introduce.

These two differences would undermine any understanding claimed if it was, as in the 'social science' approach, the aim of participation – the understanding is of a synthetic situation and it is not explicitly accounted. However, as noted above, the designer's aim in participating is to produce 'better' design solutions not descriptive accounts. Or, to re-phrase in terms of Figure 3.7, to devise products relevant to stakeholders' needs in the different (synthetic) social situations afforded by those products. So, understanding stakeholders' needs in respect to these synthetic situations is not problematic as the aim is products that afford such situations.

The 'social science' approach implies a view that 'better' products are designed in response to an understanding of stakeholders' *existing* needs. The

'design-led' approach extends this and recognises that 'better' products might also be designed in response to stakeholders' *future* or *latent* needs[41].

Figure 3.7 does not illustrate how the stakeholders' and designer's understanding relates to the participation/observation and designing activities. This is something I will return to in chapter 6 with particular reference to the operation of a critical artefact methodology (and following my discussion of critical design practices in chapter 4). However at this point, I can describe this understanding (produced within the 'design-led' approach) as fitting with the alternative view of knowledge creation embodied in the cultural probes approach discussed earlier (3.5.2, p64 and Boehner et al. 2007). The understanding is inescapably subjective and relies on an iterative process of interpretation of the designed artefacts (by the stakeholders) and the stakeholders' performances with them (by the designers). Design is fundamental to this process as it is how designers (via designing) and stakeholders (via designed artefacts) interpret the other's lives via their own experiences.

In addition to building an empathic understanding of the social context, designers can also explore and clarify this understanding through designing. Designing as a way of 'thinking out loud': exploring possibilities and trying out solutions; sketching and modelling as elements of thinking – Donald Schön (1995) and Henrik Gedenryd (1998) have discussed these ideas further. The design activity is the analysis.

Designing as a way of developing understanding is also a useful way of tackling "wicked problems", as described by Horst Rittel (1973, 1984). Rittel suggests that the complexity of contemporary society means that social policy problems resist simple definition and solution – they are "wicked" rather than "tame" (ibid.). Wicked problems cannot be easily defined and they have no single, accepted solution – for example the definition of a social policy problem and what is an acceptable solution depends on the interests of those defining it and evaluating its solution. Wicked problems cannot be solved absolutely; the situation can only be made 'better' or 'worse' – the terms of

[41] I offer a description of latent needs in 1.8 (p30).

which, again, depend on who is evaluating the solution. Rittel and others have subsequently suggested that wicked problems describe the kinds of problems that designers typically encounter and have developed strategies for dealing with (Rittel 1984, Buchanan 1995).

According to Rittel, tame problems have all the information necessary for their solution available before beginning. However some of the information needed to solve wicked problems only becomes apparent during attempts to solve them, and every attempt to solve a wicked problem changes the nature of that problem. Designers' way of dealing with wicked problems, then, is to explore their facets by devising potential solutions to them.

> *"You cannot understand the [wicked] problem without having a concept of the solution in mind" Horst Rittel, 1984 (p321)*

3.8 Conclusion

In this chapter I have reviewed approaches where an engagement with stakeholders forms part of designing for those stakeholders, in particular approaches within participatory design and certain forms of co-design. I have also reviewed two exemplar approaches where artefacts are used to engage with stakeholders, Ehn & Kyng's mock-ups and cultural probes as originally intended by Gaver et al. Through this I have suggested a framework for relating a critical artefact methodology to such approaches. Namely that they can be characterised and differentiated by their position on continua relating to (for participation as part of design) the intended result of participation and who does the designing, and (for engagement via artefacts) the intention of the engagement, the character of the artefacts, and the manner in which stakeholders engage with them.

According to this scheme, a critical artefact methodology uses stakeholder participation to *inform* design activity, the artefacts used progress from being provocative (the intent being exploration) to more 'prototypical' (the intent being testing), and consequently stakeholders engagement progresses from critical reflection towards a 'present-at-hand' evaluation of the artefacts. As such it does not include co-creation and is closer to participatory design approaches.

Stakeholder participation to inform design implies that an understanding of stakeholders' experiences is produced to affect design activity. Where designers participate with stakeholders they attract criticism for any understanding they claim to produce. I discussed above how such criticisms are legitimate only if the aim of designers' participation is to produce descriptive accounts, which relates to a step-wise relationship between participation/observation and design typified by 'social science' approaches. I offered an alternative 'design-led' approach where participation/observation informs design in a holistic manner, and design is a method of exploring and expressing the understanding gained.

In this 'design-led' approach, the aim of the designers' participation is 'better' design solutions (accepting the variety of meanings 'better' can refer to). Throughout this approach, the understanding developed is subjective and relies on the interpretation of stakeholders and designers. Stakeholders interpret the artefacts presented to them and designers interpret stakeholders' responses to the artefacts. If the aim of 'design-led' approaches is 'better' design solutions, the success of such approaches is measured by these design solutions not any understanding claimed. And the measure of these solutions must also reflect the interpretive nature of the understanding they embody – stakeholders, via their responses, should define which solutions are 'better'.

So, if a critical artefact methodology aims to produce innovative, human-centred product ideas, the measure of its success will be whether stakeholders recognise the artefacts produced as progressively more relevant to their needs.

Iterative, subjective interpretation by stakeholders and designers is central to a critical artefact methodology and other 'design-led' approaches. A tactic to ensure this interpretation is open and exploratory, used by cultural probes and, I suggest, critical artefacts, is to provoke stakeholders to be critically reflective of their beliefs and experiences. The nature of this critical reflection, how it can be used in critical design and related practices, and its relationship to Critical Theory are discussed in the next chapter.

4 Critical design practices

4.1 Introduction

In chapter 1.3 (p17), I described how Gaver & Martin's notion of conceptual designs informed my strategy for allowing stakeholders to engage with novel situations. In 1.5 (p21) I discussed how their ideas derived from Anthony Dunne's notion of critical design, and that this was, in turn, related to the principles of Critical Theory. This suggests that in order to understand how critical design operates and how critical artefact methods could operate, I should investigate which features of Critical Theory they share. I will therefore discuss Critical Theory in the second part of this chapter. But as Critical Theory is a broad and complex field, my aim in doing so will be to derive a characterization of it from which I can suggest features of a critical artefact methodology.

In the third part of this chapter I will discuss how critical design, and similar approaches, relate to my characterisation of Critical Theory. Through this discussion I will propose the notion of 'artefacts-as-critiques' and suggest how a critical artefact methodology could use them in the development of innovative product ideas.

Critical Theory and related approaches are vulnerable to charges of elitism. In the final part of this chapter I will unpick these criticisms and suggest how a critical artefact methodology may be less susceptible to them.

Dunne's critical design is not alone in deriving from Critical Theory, a number of design practices employ similar principles (both explicitly and implicitly). So, I will begin this chapter by describing several such 'critical design practices', as I shall call them, beginning with critical design.

4.2 Critical design practices

4.2.1 Dunne & Raby's critical design

"What is Critical Design?

Critical Design uses speculative design proposals to challenge narrow assumptions, preconceptions and givens about the role products play in everyday life. It is more of an attitude than anything else, a position rather than a method. There are many people doing this who have never heard of the term critical design and who have their own way of describing what they do. Naming it Critical Design is simply a useful way of making this activity more visible and subject to discussion and debate.

[..]

What is it for?

Mainly to make us think. But also raising awareness, exposing assumptions, provoking action, sparking debate, even entertaining in an intellectual sort of way, like literature or film." (Z33, Dunne & Raby 2007)

Dunne & Raby provided this summary of critical design in an interview about their work in the *Designing Critical Design* exhibition (Z33 2007b). Anthony Dunne claims the term critical design was first used in his book *Hertzian Tales* in 1999,[42] which discusses the ideas he developed whilst completing his PhD research at the Royal College of Art[43]. Together with his partner Fiona Raby, Dunne has continued to develop, practice and promote critical design through design projects, further publications (such as the book *Design Noir*, 2001), exhibitions, and teaching postgraduate students in the Design Interactions research department at the Royal College of Art (formerly the Computer Related Design Research Studio).

In *Hertzian Tales* and *Design Noir* Dunne & Raby explore and problematise the design of electronic products and their subsequent use. Via this discussion they propose an alternative form of design, critical design. Their central

[42] Dunne & Raby state this in their interview (Z33, Dunne & Raby 2007), although they admit others have developed their own variations.
[43] Details from the preface of the re-published edition in 2005. Although the text is identical in this newer edition, unless otherwise noted, page references are to the earlier edition to give a clearer appreciation of their historicity.

position is that design is ideological[44] – the products of design always embody the ideologies that create them (they reflect the world views of their designers and manufacturers) and that often the nature of these ideologies makes it undesirable for products' users to accept them unthinkingly. They categorise this ideological nature into two forms of design – "affirmative design" and "critical design":

> *"The former reinforces how things are now, it conforms to cultural, social, technical and economic expectation. Most design falls into this category. The latter rejects how things are now as being the only possibility, it provides a critique of the prevailing situation through designs that embody alternative social, cultural, technical or economic values." (Dunne & Raby 2001, p58)*

Dunne & Raby propose examples of the ideologies inherent in electronic products and the consequences of their adoption. In *Hertzian Tales* Dunne suggests:

- That design generally serves a culture of consumption, and that unthinking acceptance of this ideology of consumerism leads to industrial design maintaining a society of passive consumers;
- That the situations portrayed by design outputs are often didactic or utopian and that there is often a discrepancy between them and the everyday situations in which design outputs are actually encountered; and
- That Human Factors approaches are limited, producing products that are primarily "usable" and "will not confuse or disappoint" (1999, p32). Such products are designed to be easy to use, where their function (which is directly in response to perceived user needs) is afforded and easy to accomplish. But Dunne suggests that there are benefits to products doing more - in confounding expectations. He suggests that affordances (after Donald Norman) are not fixed aspects of products to be understood; rather they are individually, socially and culturally dynamic. Products are interpreted (individually and situatedly) rather than understood. This view

[44] 'I am not arguing for a way of designing that is free from ideological content but, rather, one that draws attention to the fact that design is always ideological.' (Dunne 1999, p30)

leads to a form of design which is about more than just needs-satisfaction and ease of use.

In *Design Noir* Dunne & Raby suggest industrial design's role in the design of electronic products is casting designers as mere semioticians, as illustrated by the example of the Sony Walkman.[45] The original Walkman created a new kind of experience (mobile, personal music) and redefined the role of technology in public spaces[46]. The numerous subsequent designs of 'walkmans' have not caused such fundamental changes, instead re-presenting the same product purpose in slightly different forms. Dunne & Raby feel that the majority of electronic product design suffers from this problem – dealing in the signs to communicate what a product does, rather than devising new product roles and purposes. They refer to this as one 'genre' of product design, where "the emphasis is on easy pleasure and conformist values" and which "reinforces the status quo rather than challenging it" (2001, p45).

Dunne & Raby discuss several possible themes in an expanded view of design, which in turn suggest a "toolbox" of strategies for critical design (1999). In *Hertzian Tales* Dunne introduces the idea of "post-optimal" electronic objects. He argues that optimal technical and semiotic functionality are attainable so, to go beyond them, designers should explore metaphysics, poetry and aesthetics: "In a world where practicality and functionality can be taken for granted, the aesthetics of the post-optimal objects could provide new experiences of everyday life, new poetic dimensions" (1999, p29). Consequently he suggests several design strategies:

- The design of "para-functional objects" describing this as: "a form of design where function is used to encourage reflection on how electronic products condition our behaviour. The prefix 'para-' suggests that such design is within the realms of utility but attempts to go beyond

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[45] Referring to designers as makers and purveyors of 'signs' rather than those involved in the study of signs.

[46] Dunne & Raby make great claims of the Walkman, "[offering] people a new kind of relationship to urban space" (2001, p45), as being exemplar of what the design of electronic products can be. However to infer that this radical new social application of technology was somehow designed is problematic. There are several stories as to how the Walkman was devised, but none tell of Sony's desire to affect social change. The effects it produced were incidental and not consciously engineered.

conventional definitions of functionalism to include the poetic." (ibid., p44);

- Making "user-unfriendly" products. Dunne suggests that 'user-friendly' products steer their users' behaviour in a particular way, one that is based on a generalised model of the user that was used to design those products. This model is in turn based on certain conceptual models, values and systems of thought. Dunne's solution is to include user-unfriendliness as a characteristic of post-optimal objects – "a form of gentle provocation" (ibid., p38);
- Making products with "poetic" dimensions. Dunne finds products with functional transparency[47] problematic: "Although transparency might improve efficiency and performance, it limits the potential richness of our engagement with the emerging electronic environment and encourages unthinking assimilation of the ideologies embedded in electronic objects. Instead, the distance between ourselves and the environment might be 'poeticised' to encourage sceptical sensitivity to the values and ideas this environment embodies." (ibid., p43).

Dunne also subscribes to a view of users as co-creators (with designers) in the meanings and uses ascribed to products. In considering: "the user as a protagonist and co-producer of narrative experience rather than a passive consumer of a product's meaning" (ibid., p58) he develops the notion of designer as author:

> *"[..] design could also develop new attitudes to electronic technology. To do this, designers could become more like authors, drawing from the narrative space of electronic object misuse and abuse to create alternative contexts of use and need." (ibid., p64).*

Dunne considers expanding the notion of non-working design models to consider them in the same sense as mathematical or cognitive models – that they are not just for testing visual appearance but also the underlying ideas of the objects:

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[47] A functionally transparent product is a product where its function is immediately obvious from its form.

"An expanded view of the conceptual design model might regard it as embodying the essence of a design idea, a 'genotype' rather than prototype [..] The object's 'content' or 'genes' are important, not its appearance." (ibid., p72).

Dunne & Raby re-present these ideas with their description of "design noir" – an alternative 'genre' of design to affirmative design (2001). Borrowing the metaphor of cinema they suggest:

"If the current situation in product design is analogous to the Hollywood blockbuster, then an interesting place to explore in more detail might be its opposite: Design Noir. As a genre, it would focus on how the psychological dimensions of experiences offered through electronic products can be expanded. By referring to the world of product misuse and abuse, where design overflows its material limits and subverts the function of everyday objects, this product genre would address the darker, conceptual models of need that are usually limited to cinema and literature.

[..] the user would become a protagonist and co-producer of narrative experience rather than a passive consumer of a product's meaning

[..] Imagine objects that generate 'existential moments' – a dilemma for instance – which they would stage or dramatise. These objects would not help people to adapt to existing social, cultural and political values. Instead, the product would force a decision onto the user, revealing how limited choices are usually hard-wired into products for us." (ibid., p46).

They note that their 'Noir products' would not be designed for mass consumption – people may not want the 'noir experiences' that they offer every day, and their effectiveness could wane over time. Instead they suggest that such products would be rentable, "providing a service in the form of a reflective experience" (ibid., p75).

In both *Hertzian Tales* and *Design Noir*, Dunne & Raby discuss the idea of value fictions. Dunne describes his conceptual design proposals for post-optimal electronic objects as: " 'value-fictions' – they try to maintain a degree of technological realism while exploring values different from those current" (1999, p92). Dunne & Raby offer a guide as to how unfamiliar these value fictions must be in order to be useful: "A slight strangeness is the key – too

weird and they are instantly dismissed, not strange enough and they're absorbed into everyday reality" (2001, p63).

Figure 4.1 *GPS Table* (2001)
(image courtesy of Dunne & Raby, photo: Jason Evans)

Via a series of design projects, Dunne & Raby have employed their idea of critical design to produce conceptual designs. Dunne first discussed an interest in "hertzian space" in *Hertzian Tales* – the notion that electromagnetic waves[48], although invisible, are physical phenomena – and designed artefacts to prompt users to explore this aspect of their environment. Dunne & Raby developed similar themes in the *Placebo* project, which they documented in *Design Noir*. For example, the *GPS Table* (Figure 4.1) has a GPS[49] sensor inside it. A small display set into the tabletop shows the GPS location, but when no signals can be received (such as when the table is indoors), the table displays that it is "lost". Dunne & Raby "like the idea that people might feel a little cruel keeping it indoors" (2001, p79). In *Placebo* Dunne & Raby asked members of the public to 'adopt' their conceptual designs and the family who adopted the *GPS Table*

[48] Such as radio signals and the electromagnetic noise produced by all electronic devices.
[49] Global Positioning System – a network of US satellites whose signals can be used to determine the geographic location of the receiver.

described developing a sense of affection for it – they were concerned when it was 'lost' and felt happier once they had moved it to a location where it could 'find' itself.

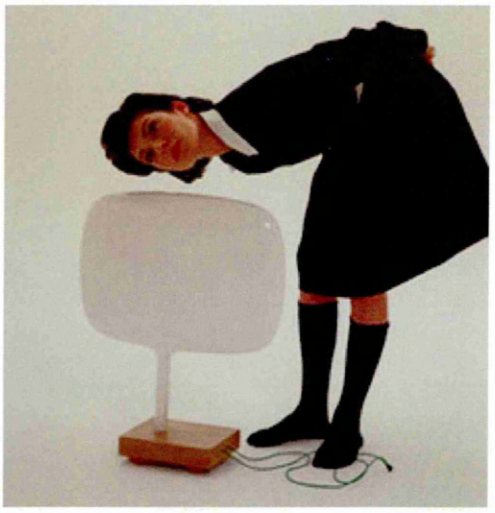

Figure 4.2 *Robot 4* (2007)
(image courtesy of Dunne & Raby, photo: Per Tingleff)

Dunne & Raby's conceptual designs from the project *Technological Dream Series/No. 1 Robots* aim to question what roles robots might take in our everyday lives. For example they describe *Robot 4* (Figure 4.2) as "very needy" (Z33 2007a) – although very intelligent, its underdeveloped body means that it depends on its owner to move it around; communicating this need via its own language in which human traces can be heard.

Dunne & Raby's conceptual designs are not mass-produced and not intended for sale. They are usually disseminated via gallery exhibition[50] – the objects from the *Placebo* project have also subsequently been exhibited. This prompts the question is critical design in fact art? Dunne & Raby are clear that they think not:

> *"It is definitely not art. It might borrow heavily from art in terms of methods and approaches but that's it. We expect art to be shocking and extreme. Critical Design needs to be closer to the everyday, that's where its power to disturb comes from. Too weird and it will be dismissed as art, too normal and it will be effortlessly assimilated. If it is regarded as art it is easier to deal with, but if it remains as design it is more disturbing,*

[50] See list of previous exhibitions available on their website (Dunne and Raby 2006).

it suggests that the everyday as we know it could be different, that things could change."
(Z33, Dunne & Raby 2007)

But their comment implies that art cannot be subtle or everyday, a claim artists would probably find controversial. They suggest that (critical) conceptual designs should be perceived as design objects not art objects. But placing them in a gallery may do harm in this respect – perhaps we expect to see art in galleries? Also the principle that considering critical artefacts *as* design makes them more disturbing doesn't mean that they *are* design. It is feasible that an artist may produce work whose power depends on its presentation as a designed product. There is clearly a 'grey area' between design and art where critical design resides.

4.2.2 Other 'critical designers'

As Dunne & Raby admit above, critical design is not limited to their work but includes several other practitioners who share similar attitudes and aims (although not always referring to their practice as critical design). This reflects a growing trend of questioning the nature of design and its role in society. A complete review of such 'critical designers' and their work is impractical here, but it is sufficient to note that their aims and strategies are similar to Dunne & Raby's form of critical design – to produce conceptual designs that question the, as they see it, limited and problematic role of 'mainstream' design and its products in contemporary society. A representative sample of critical designers and their work is given below to illustrate this similarity.

Often critical designers are those whose experience practicing design has prompted them to re-evaluate 'mainstream' design, direct their practice towards commenting on it, and reclaim design as a medium for critical reflection – such as the co-exhibitors in *Designing Critical Design*, Jurgen Bey and Martí Guixé (Z33 2007b) and Naylor & Ball's poeticising of mature products such as office chairs (2005).

Figure 4.3 *netUmbrella* (2003)
(image courtesy of Héctor Serrano & Victor Viña, photo: Mocho)

Figure 4.4 *SoMo1* (2002)
(image courtesy of IDEO)

Critical design has been used by designers to explore existing products and technologies and to suggest radical new interpretations and applications of them. For example: Serrano and Viña's *netObjects* project (2003, Gibson 2004) re-appropriated everyday objects to provide access to online content for people who were generally excluded from web use via PCs. Their *netUmbrella* (Figure

4.3) displays weather information about its location from a weather website via a Bluetooth[51] connection; And design consultancy IDEO's *Social Mobiles* project (Ideo 2002, Pullin 2006) explored the social impact of mobile phones. Their paired *SoMo1* mobile phones (Figure 4.4) deliver proportional electric shocks to the listener if the speaker is talking too loudly.

The growing topicality of critical design has produced a number of young designers whose work, often in the form of student projects, uses provocative conceptual designs. For example: Sandelin & Torstensson's *Digital Peacock Tails* project (their joint MA thesis) (2008) produced 'post-optimal objects' that sacrifice instrumental function for expressive function – as a peacock's tail might be said to do. Their *Siren Shoes* (Figure 4.5) make a loud noise when both shoes touch the ground, so "the wearer faces the dilemma of either altering her gait or becoming a shrieking public nuisance" (ibid.); And Pohflepp's *Buttons* (Figure 4.6) (2006) is a "blind" camera that, instead of taking photographs, "shoots other people's photos" by downloading photos shared on the internet taken at the same instant its button is pressed.

Figure 4.5 *Siren Shoes* (2002-3)
(image courtesy of Sandelin & Torstensson, www.unsworn.org/dpt)

[51] Bluetooth – wireless communication technology conforming to a published standard.

Figure 4.6 *Buttons* (2006)
(images courtesy of Sascha Pohflepp)

Whilst Dunne & Raby (and others) have developed a theoretical position for their work, there are designers who employ a more intuitive satire of their own profession. The provocative and challenging conceptual designs they produce could be comfortably described as critical design, but perhaps the thinking behind them and their ultimate aim is less driven by a conscious critique and exposition of contemporary values and more a desire to 'poke fun' at the products of a rampant consumer society.

For example the Human Beans partnership of two London-based design professionals state their manifesto as: "We make fictional products by hacking commercial culture [..] Our aim is to challenge assumptions and point in new directions" (Human Beans 2006). Several of their "fictional products" seem to fit the bill as critical design: *Mr Germy* (Figure 4.7) is a bacteria-infused chewing toy to boost infants' immune systems; in buying *Live Cigarettes* (Figure 4.8) you collect points for the treatment of smoking-related diseases; *PowerPizza* (Figure 4.9) enables you to disguise your high-value laptop within a low-value pizza delivery box. These conceptual designs afford critical reflection on our assumptions about hygiene, healthy living and perceived value, but they have not been developed as a deliberate critique of them. Rather they are incidental aspects of a wider satire of the impacts of design and marketing developed from within those professions.

Figure 4.7 *Mr Germy* (2001)
(image courtesy of and copyright © Human Beans, www.humanbeans.net)

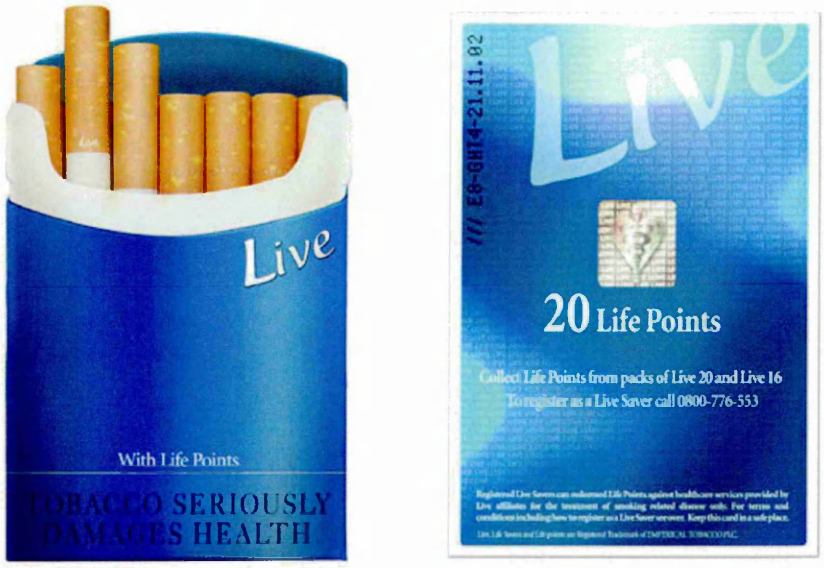

Figure 4.8 *Live Cigarettes* (2003)
(images courtesy of and copyright © Human Beans, www.humanbeans.net)

Figure 4.9 *Power Pizza* (2001)
(images courtesy of and copyright © Human Beans, www.humanbeans.net)

Human Beans are interested in the experiences surrounding products in contemporary society – how we use products, how products are marketed to us, the identities and aspirations we develop around products. As designers working within design and marketing they are experienced in the tactics used to influence these experiences. Their approach, then, is a more 'designerly' intuitive application and satire of these tactics rather than a philosophically-informed and directed critique. The manner in which Human Beans present their fictional products illustrates this difference. Whereas Dunne & Raby concentrate on communicating the functional purpose of their concepts, Human Beans go beyond this to communicating the numerous ways of encountering their concepts as 'real' products. Their concepts are presented via realistic packaging, advertising and other promotional materials. Although their theoretical position is less explicitly defined, Human Beans concepts' power is in their believability; a believability that has been achieved through the intuitive knowledge of practicing designers.

The work of the designers who belong to the Droog Design collective from the 1990s onwards could be seen as pioneers of such 'satirical design'. Droog Design grew from an exhibition curated by Renny Ramakers and Gijs Bakker in 1993. The designers in this exhibition, and those that have joined the collective subsequently, are united by their 'dry' mentality (droog means dry in Dutch), in their own words: " 'Dry' as that essentially Dutch inclination to 'do normal' and at the same time critically investigate what you're doing and the way you do it", "[Droog designers] need to share a mentality that looks at

design as both functional statement and conceptual discourse" (Droog Design 2007). But again the emphasis of Droog products is of presenting artefacts that could be (and often are) marketed and sold.

4.2.3 Reflective design

Reflective design is an approach developed by Phoebe Sengers and her colleagues in the Culturally Embedded Computing Group at Cornell University[52], particularly as applied to human computer interaction (HCI). Sengers' work is based on critical technical practice (which I will discuss later) and centres on building technologies to encourage users and designers to reflect on technology's role in everyday life and to think differently about it (2008).

> *"As designers, we are left to wonder: what values, attitudes, and ways of looking at the world are we unconsciously building into our technology, and what are their effects?" (Sengers et al. 2005, p49)*

Sengers et al. note that there are gaps in design and research methods caused by designers' unthinking adoption of the values within them. For example a focus on cognition to the detriment of emotional aspects, and the dominance of work-centred approaches "risking making all of life like work" (ibid., p49). They ask "how can we find and address blind spots in our approaches in order to make design decisions that may lead to improved quality of life?" and suggest that "in each of these cases, critical reflection identified particular unconscious assumptions in HCI that might result in negative impacts on our quality of life" (ibid., p49).

Reflective design involves critical reflection on practice within the practice itself (by researchers and designers), to "develop a systematic approach to folding critical reflection into the practice of technology design", but this reflection is not just limited to practitioners and they argue that "critical reflection *itself*, can and should be a core principle of technology design for identifying blind spots and opening new design spaces" (ibid., p49, their *emphasis*). Critical reflection is not just for opening up approaches for designers,

[52] See http://cemcom.infosci.cornell.edu/, last accessed 17 September 2008.

it can also "support new awareness and freedom for *users* as well", "technology design practices should support *both* designers *and* users in ongoing critical reflection about technology and its relationship to human life" (ibid., p50, their *emphasis*). Sengers explicitly links such critical reflection to Critical Theory and defines it as: "bringing unconscious aspects of experience to conscious awareness, thereby making them available for conscious choice"; and that such reflection is "not a purely cognitive activity, but is folded into all our ways of seeing and experiencing the world" (ibid., p50).

Reflective design draws on ideas from existing "critical approaches in HCI", such as participatory design[53], Batya Friedman's Value Sensitive Design (VSD), Bill Gaver's Ludic Design, Critical Technical Practice, Donald Schön's reflection-in-action, and Dunne & Raby's critical design. Referring to the latter, Sengers notes that "the provocative nature of critical design can backfire if people miss the ironic or subtle commentary" and that they want to use critical design "in a manner that provides more footholds for including users and [sic] well as designers in the debate" (ibid., p51).

In presenting reflective design, Sengers et al. (ibid.) offer six core principles:

1. Designers should use reflection to uncover and alter the limitations of design practice;
2. Designers should use reflection to re-understand their own role in the technology design process;
3. Designers should support users in reflecting on their lives;
4. Technology should support scepticism about and reinterpretation of its own working;
5. Reflection is not a separate activity from action but is folded into it as an integral part of experience;
6. Dialogic engagement between designers and users through technology can enhance reflection.

And six strategies for reflective design (although they anticipate this list will grow):

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[53] Particularly the Scandinavian 'flavour', such as seen in the work of Ehn & Kyng (see 3.5.1, p60).

1. Provide for interpretive flexibility;
2. Give users license to participate;
3. Provide dynamic feedback to users;
4. Inspire rich feedback from users;
5. Build technology as a probe;
6. Invert metaphors and cross boundaries.

Sengers describes an application of reflective design in the design of a mobile, context-aware computing device for a museum (ibid.). Recognising that information technology in museums and galleries tended to re-enforce a view that they were primarily about information transfer (i.e. a museum transfers knowledge from 'experts' to the 'ignorant' visitors), a handheld device was developed that explored the possibilities of such spaces for social interactions. For instance, the device allowed visitors to leave 'digital imprints' on exhibits thus enabling future visitors to use the device to see who else has enjoyed that particular exhibit (Figure 4.10). One visitor described their experience of finding an object with only one other imprint on it as causing them to wonder if the person who left it was a "kindred spirit" (ibid., p53).

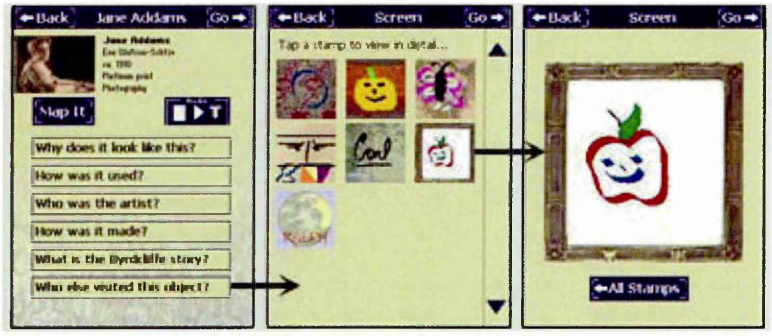

Figure 4.10 screenshots from a handheld museum tour guide
(for the question "who else visited this object?")
(image courtesy of Kirsten Boehner)

4.2.4 Critical technical practice

Philip Agre's experiences (1997) in the field of Artificial Intelligence (AI) led him to call for a "critical technical practice" (CTP). He noticed that the way AI designers and researchers thought about 'intelligence' influenced the AI systems they developed – the manner in which 'intelligence' was conceptualised and discussed was, in some way, translated into the technical construction of AI systems (ibid.). He suggests that (at his time of writing) AI

systems reflected a limited concept of what 'intelligence' is and how people, as 'intelligent beings', interact with their environment. Recognising this limitation, Agre argues, is therefore important in developing a more holistic conceptualisation of 'intelligence' to inform the development of artificial 'intelligence' systems. Although discussing AI in particular, Agre claims that including such critically reflective elements could benefit all technical practices:

> *"What is needed [..] is a critical technical practice - a technical practice for which critical reflection upon the practice is part of the practice itself.[..] In the case of AI, I will argue that certain conceptions of human life are reproduced through the discourses and practices of technical work" (ibid., pxii).*

Agre shows how these "conceptions of human life" are expressed within the language, terminology and attendant imagery commonly associated with AI design and research. He terms such mental models "substantive metaphors" and suggests that they exist within other disciplines, in addition to AI, and influence the technical systems and artefacts they produce. His contention is that some things are more easily explained within the language etc. associated with a substantive metaphor than others. Such metaphors then "define a hierarchical opposition between central and marginal cases, that is, between those phenomena that are readily assimilated to the metaphor and those that are not" (ibid., p45). So, any reasoning is limited by a discipline's substantive metaphor – it will be unable to adequately account for marginal phenomena (according to the metaphor). Agre sees the problem with existing technical practices (as he calls them) is that they see inadequately explained phenomena as further problems to be solved, not as limitations of the practice/discipline's metaphorical underpinning.

Agre suggests that AI has suffered from being founded upon a substantive metaphor he terms "mentalism", derived from cognitive science, where "the mind is a space with an inside, an outside, a boundary, and contents" (ibid., p27-28). Phenomena become either central or marginal according to whether they can be adequately explained by this conceptualisation. For example detached 'cognition' and internalised 'thinking' are central to this metaphor; complex interactions between individuals and the 'outside' world are marginal,

less easily described by the metaphor. The presence of a central/marginal divide highlights the shortcomings of substantive metaphors and the need to recognise and critically reflect on their influence on technical practice. To do so, Agre suggests focussing on the marginal phenomena to create new substantive metaphors – in this example "interactionism".

In discussing mentalism and interactionism he notes metaphors are instrumental in several ways:

> *"They are not simply means of description; they are also means of choosing problems, evaluating solutions, judging plausibility, setting priorities, and parceling out phenomena to subfields." (ibid., p54).*

Although Agre goes on to illustrate how adopting an 'interactionist' metaphor can improve the design of AI systems, his aim isn't to replace the mentalist metaphor. Rather it is to recognise and critically reflect on the effects of *all* such metaphors within technical practice:

> *"If interactionism someday attains the unreflexively hegemonic status in AI that mentalism enjoys now, the best antidote will no doubt be a mentalist revival." (ibid., p54)*

Agre's aim isn't to replace existing modes of theory and practice but to afford ongoing critical reflection on the nature of theory and practice – that *every* mode is influenced and limited by its underpinning aspects (his substantive metaphors). He doesn't want to replace one substantive metaphor with another, rather encourage recognition of the existence and limitations of *all* substantive metaphors.

4.2.5 Janssens' critical design

Nel Janssens (2008a, 2008b) is developing a notion of critical design related to the use of utopian thinking in architecture. She posits research by critical design as a method of creating knowledge in the field of urbanism. This developing approach uses critical design as a way of linking "designerly thinking" (as ways of exploring possible solutions) and "utopian thinking" (as ways of exploring possible futures) (2008a, 2008b).

Janssens explicitly relates her notion of critical design to Critical Theory[54] and, although it has resemblances to the critical design of Dunne & Raby, it was developed completely independently of it[55], and is employed in a different sense – as an architectural research method rather than as a critique of 'mainstream' design (2008a). She summarises:

> *"Critical design is not only about raising awareness of other possibilities but, in exploring the 'space of possibilities' by going back and fro between present and future, generating new concepts that can shift design attention into new thinking frames." (2008b, p11)*

4.3 Critical Theory

4.3.1 The Frankfurt School

The Critical Theory that Dunne and Sengers refer to derives from the work of the Frankfurt School of theorists, also often termed critical social theory (e.g. Dant 2003, Calhoun 1995). The nature of the Frankfurt School and its constituent theorists is much debated, but it is generally agreed that it begins with the writings of the Institute for Social Research formed in Frankfurt in 1924 and includes the work of Max Horkheimer, Theodor Adorno, Herbert Marcuse, Walter Benjamin (and several others) and the later work of 'second generation theorists' such as, most notably, Jürgen Habermas (Crotty 2003). Most of the Institute's members fled Germany in the mid-1930s as their ideas (and several members' Jewishness) found increasing disfavour under Hitler's Nazi party. The Institute continued to practice in the United States until after the Second World War when it returned to Frankfurt where it re-opened officially in November 1951.

'Critical Theory' could be said to be the Frankfurt School's common theme, their main philosophical project. Although the term was not used

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[54] "The term 'Critical Design' in this context is chosen by assumed analogy and complementarity with the already existing term 'Critical Theory'." (Janssens 2008a, p166) Janssens also notes characteristics of utopian thinking that are shared with Critical Theory, such as its realisation of hidden possibilities for the purpose of debate.

[55] Janssens and I have discussed a shared interest in critical design since 2007 when I referred her to the work of Dunne & Raby. Prior to these discussions, Janssens had already begun outlining her notion of critical design (e.g. Janssens 2006).

explicitly to describe the Frankfurt School's work until the 1950s, the ideas it characterised were present beforehand. The title of Max Horkeimer's 1937 essay *Traditional and Critical Theory* gives a flavour of it – that it is a response to the so-called 'traditional theories' the Frankfurt School saw around them. This Critical Theory drew upon and reacted to the ideas of Marx and, before him, Hegel and Kant (to name but two)[56].

But such Critical Theory is not limited to the writings of the Frankfurt School theorists. Or, to put it another way, the distinction of which theorists belong to the Frankfurt School, and therefore produce Critical Theory, is debatable[57]. Below, I will discuss a characterization of this Critical Theory, and how critical design practices relate to this characterization. But first I will explain my aims in discussing Critical Theory as espoused by the Frankfurt School.

4.3.2 Why talk about Critical Theory?

I approach Critical Theory as a pragmatic designer rather than as a social theorist. My interest is in 'what Critical Theory can do for me' – how it can assist my development of a critical artefact methodology and the practical methods that result from it. This was prompted by Dunne's alignment of critical design with critical theories as opposed to traditional theories (see 1.5, p21) and my appropriation of Gaver & Martin's use of Dunne's critical design in my preliminary work (see 1.3, p17). It is in this spirit that I will discuss Critical Theory and related practices – deriving an understanding of them that is focussed on and could lead to more effective practical methods.

My aim in discussing Critical Theory is not to explore its philosophical ancestry or its relationship to subsequent thought – such as Critical Theory's epistemological and ontological claims (its re-conceptualisation of knowledge and being). Critical Theory is not a single defined 'theory' – it is not fixed and

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[56] "Habermas and the Frankfurt School stand explicitly in the line of development, reaction and counter-reaction to the philosophy of Hegel and to that of his successor – in so far as he is to be taken, controversially, as his successor – Marx." (Geuss 1981, book Series Editor's introduction p viii)
"the idea of Critical Theory as a distinctive project [..] is rooted in Hegel and in the responses to Hegel begun by the "Young Hegelians," Marx and Kierkegaard." (Calhoun 1995, p14)

[57] For example Dant (2003) discusses Critical Theory in relation to the work of Barthes and Baudrillard, amongst others.

does not derive from a single unified school (the term 'Frankfurt School' is misleading in this sense)[58]. Kincheloe and McLaren (2005) note that "Critical Theory should not be treated as a universal grammar of revolutionary thought objectified and reduced to discrete formulaic pronouncements or strategies" they refer to it as an "evolving criticality" linked to a set of "criticalist traditions" (p304-5). Critical Theory is dynamic and evolving, so to perform a rigorous analysis[59] of it requires time and expertise that are not relevant to this PhD as an investigation into design methods by a designer[60].

Although Critical Theory is a dynamic area, there are enough commonalities to enable me to suggest some basic characteristics of 'critical theories'. The characteristics I will suggest are those I recognise as being embodied in critical design practices – their theoretical ancestry. In doing so, some of the detail and subtlety necessary for a fuller appreciation of Critical Theory will be lost. Hence the characterization that I will suggest is my own and for a particular limited purpose. It is not an attempt to provide a definitive description – although anyone familiar with Critical Theory should recognise it – rather it is a simplified model, reflecting my interests as a designer, to enable comparison with critical design practices.

So, my aim in discussing Critical Theory is to derive a characterization of it that I can then use to unpick the facets of critical design practices and a critical artefact methodology. I will use this characterization as a framework for comparing critical design practices, and consequently positioning my work in relation to them. It also will enable me to offer explanations for how critical design practices operate and suggest features of a critical artefact methodology if it is to utilise similar principles.

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[58] "The term 'Critical Theory' suggests a coherent body of thought but, given the turbulent history of the Institute and the varied backgrounds, widely different disciplines and strong personalities of its membership, it would be most surprising if a unified approach, and therefore a 'School' in the true sense of the word, had emerged." (Crotty 2003, p130)

[59] Others have explored Critical Theory via various means, for example (amongst other things): Dant (2003) discusses it as a critique of culture and cultural forms; Geuss (1981) discusses it as a critique of ideology; Calhoun (1995) discusses it as a critique of knowledge; and all three relate Critical Theory to modernism and post-modernism.

[60] This research strategy is discussed further in chapter 2.

4.3.3 A characterization of Critical Theory

The title of Horkheimer's 1937 essay suggests that Critical Theory is something distinct and different to other forms of theory – 'traditional theory' as he termed it. It is not just *another* theory; it is a new conceptualization *of* theory. In discussing forms of critical enquiry typified by the Frankfurt School, Crotty gives a flavour of this difference:

> *"It is a contrast between a research that seeks merely to understand and a research that challenges ... between a research that reads the situation in terms of interaction and community and a research that reads it in terms of conflict and oppression ... between a research that accepts the* status quo *and a research that seeks to bring about change." (Crotty 2003, p113)*

Critical Theory does not just attempt to explain or understand the world – as Horkheimer's 'traditional' theory could be said to do – it also challenges that understanding and thereby attempts to transform the (social) world. In part, this conceptualization recognises that theories are not independent of the social world they explain. They are not reasoned and subsequently understood in isolation, unaffected by their historical and cultural contexts or by social practice itself:

> *"What distinguished [traditional theory] from Critical Theory was the conception that theory – and science generally – should somehow be understood as a thing apart from the rest of social practice, the province of a group of free-floating intellectuals as Mannheim saw it or simply the province of the individual knower in the tradition of Descartes and Kant." (Calhoun 1995, p19)*

Calhoun goes on to refer to an analogy of such 'independently-derived' theories as coming from the "umpire's chair" rather than the melee of the social world itself:

> *"Since so much theory seeks the umpire's chair, it seems useful to have a special term for theory that is self-conscious about its historicity, its place in dialogue and among cultures, its irreducibility to facts, and its engagement in the practical world. [..] we can call it Critical Theory" (ibid., p11).*

Critical Theory, then, is also reflexive. It attempts to explain and transform the world, but takes note of its role in doing so.

But how does challenging our understanding of the social world transform the social world? Calhoun offers an explanation that relates to Critical Theory as a new concept of theory:

> *"Even when we speak with more sophistication of theory as explanation and methods for constructing explanations, we fail to do justice to the role of theory in* constituting *our very access to the social world, including the facts about which we theorize and the practical actions through which we test propositions and understanding." (ibid., p7, his* emphasis*)*

Theories are not just *explanations* of the social world they are *part* of the social world – our engagement with the social world is mediated by our understanding of it. So to change the world, change the way we think about it. Dant (2003) suggests this transformation might be fostered by critiques, which have two elements "from Kant, the notion of a *reflection on the foundations of knowledge*; and from Hegel, a *liberation from the constraints on our thought*" (p7, his *emphasis*).

Or to rephrase, transformation by reflecting on *how* we know what we know and freeing ourselves from what we assume we *can* think and know.

All this discussion of transformation prompts another question: does the world need changing? The historical context from which Critical Theory sprang suggests it does:

> *"Revolutions, whether economic, political or both, have failed to redirect the course of history to free the people of a society from the social consequences of its economic strategy. The Frankfurt critical theorists were responding to the failure of socialist revolution in Russia to lead to such a solution and to the dire consequences of a direct political transformation initiated by the Nazis." (ibid., p158)*

Russian and German societies struggled under regimes that propagated oppressive power relationships. A common theme in Critical Theory and its descendants is the emancipation of such oppressed societies. This can be seen in the Frankfurt School's early aim of "broadening scientific Marxism" (Wiggerhaus quoted in Crotty 2003, p125) – dealing with the oppressive power

relationships inherent in a capitalist society revolving on the ownership of the means of production. Geuss (1981) discusses the "Critical Theory of society" which supposedly arose from the work of Marx' in this respect:

> *"The very heart of the Critical Theory of society is its criticism of ideology. Their ideology is what prevents the agents in the society from correctly perceiving their true situation and real interests; if they are to free themselves from social repression, the agents must rid themselves of ideological illusion." (p2-3).*

And below (4.3.5, p113) I will discuss another example of oppression in critical pedagogy and the work of Paulo Friere: the oppression of peasant farmers by the power regimes propagated by their education system.

This highlights another characteristic of Critical Theory – that it is political[61]. The transformation it aims for is making society fairer. Crotty (2003) suggest that "Horkheimer [was] in pursuit of a theory that is wedded to practice in the service of a more just organisation of life in society" (p130). So, not only is Critical Theory part of society, it has a moral agenda in this participation. It isn't objective and it isn't neutral.

Also implicit in Geuss' comment on the Critical Theory of society, and in the concept of Critical Theory in general, is that members of society are to some extent unaware of their oppression. If, as Critical Theory suggests, understanding is influenced by contextual factors (as discussed above), then it is society's unawareness of those factors that propagates its oppression.

So, to summarise my characterization of Critical Theory:

- Critical Theory represents a different conceptualisation of theory – it aims not to just understand the world but to challenge that understanding;
- Critical Theory recognises that all understanding (and theories) needs to be understood in its cultural, historical and practical context; And that:
- People are often unaware of the effects of such factors on their lives; Namely that:

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[61] The Oxford English Dictionary (Oxford University Press 2002) defines politics as:
"1 the activities associated with the governance of a country or area. 2 activities aimed at improving someone's status within an organization 3 the principles relating to or inherent in a sphere or activity, especially when concerned with power and status."
I suggest Critical Theory is political in the third sense.

- People's unawareness propagates power relationships that oppress them;
- Critical Theory is reflexive – it accepts that theory is part of the way we engage with the social world, not an objective explanation of that world; So:
- Critical Theory can change the social world by changing the way we think about it, and therefore engage with it; And:
- As such Critical Theory is political – it has a moral agenda in its involvement with society, to 'make a fairer world'.

This characterization prompts the question how can it be used to unpick critical design practices? My way forward is to ask what the aim of Critical Theory is and what are the strategies for achieving it, and then explore whether critical design practices have similar aims and strategies.

Geuss (1981) offers a definition[62]:

> *"Critical theories aim at emancipation and enlightenment, at making agents aware of hidden coercion, thereby freeing them from that coercion and putting them in a position to determine where their true interests lie." (p55)*

This definition prompts further questions: enlightenment of what and in who? And emancipation how and of who?

Calhoun (1995) suggests that "critical social theory makes the very givenness of the world the object of exploration and analysis" (p8). This 'givenness' relates to my characterization in two ways: firstly in the sense that our understanding of the social world is situated in and influenced by numerous factors; and secondly that this understanding propagates oppressive power relationships if left unchallenged.

Calhoun outlines the influencing factors when he discusses Critical Theory as producing critique in four senses, three of which are illuminating here:

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[62] Geuss discusses the Frankfurt School's distinction between critical theories and scientific theories (rather than referring to traditional theories although they broadly relate to the same thing – the theories which critical theories are a reaction against). He suggests they differ in their cognitive structure, the types of confirmation they require, and their aim or goal – the latter being of relevance to my discussion.

"1. a critical engagement with the theorist's contemporary social world, recognising that the existing state of affairs does not exhaust all possibilities, and offering positive implications for social action;

2. a critical account of the historical and cultural conditions (both social and personal) on which the theorist's own intellectual activity depends;

3. a continuous critical re-examination of the constructive categories and conceptual frameworks of the theorist's understanding, including the historical construction of those frameworks." (ibid., p35)

So, to rephrase, our understanding is influenced by:

1. an assumption of the social world as a fixed/only possibility;
2. the theorist's own thinking as affected by historical and cultural conditions (personal and social);
3. the building blocks of the theorist's thinking (keywords, conceptual frameworks, terminology and categories) and how they have been shaped historically.

Critical Theory aims to enlighten us of this 'givenness', and by doing so frees us of oppressive power relationships – "freeing agents from hidden coercion so that they can determine their true interests" as Geuss might put it. This statement recalls the question of *who* is being enlightened.

Dant (2003) suggests that:

"Cultural critique produces nothing — but texts. It is itself a reproduction of culture, stimulating the process of culture as reflection. What might arise from it, however, is a culture that is constantly questioning itself, resisting the tendency to accept and take for granted. Its impact, if it has any, is on individuals – those who engage with the texts. And if it has any effect, it is to stimulate a constant state of tension between the individual and the culture, to foster a sense of discontent, a sense that things could be better." (p16)

This implies that it is those who engage with the products of Critical Theory (its texts) who are enlightened. But, as I shall discuss the importance of later in respect to critical design (p118), this engagement is of a particular form – it is a *reading* of those texts, an engagement with the ideas within them. And if Critical Theory does change society, it does so by producing (in the readers of

its texts) people who are constantly critical of their society. Critical Theory does not transform society directly.

Dant's comments above also point to how Critical Theory aims to achieve emancipation: via critiques. Calhoun (1995) describes it thus:

> *"At the heart of Critical Theory lay the notion of "immanent critique," a critique that worked from within the categories of existing thought, radicalized them, and showed in varying degrees both their problems and their unrecognized possibilities." (p22)*

For critical theories, these critiques are alternative theories of the social world that both explain and challenge it – revealing the influences and assumptions inherent in the status quo (Geuss' 'hidden coercion') and thereby fostering change (albeit indirectly, as suggested above). I will discuss further below how artefacts might also be critiques.

Finally who is emancipated by Critical Theory? The political nature of Critical Theory answers this: those (unknowingly) oppressed by the power relationships inherent in the status quo. Again, referring to Dant, this may be indirect emancipation as it relies upon the readers of Critical Theory's texts fostering a society that questions itself.

The notions of enlightenment and emancipation provide a useful framework for exploring Critical Theory. Answering the questions about what, who and how in relation to enlightenment and emancipation translated my characterization of Critical Theory into a suggestion of how it operates. A next step, then, would be to re-examine critical design practices by answering these questions, examine how their operation resembles that of Critical Theory, and consequently suggest features of a critical artefact methodology if it is to utilise similar principles. However I will first consider how Critical Theory is applied in another field – education – with an example of a combination of theory and practice in the spirit of Critical Theory: critical pedagogy. But I will begin by describing critical thinking, another frequently used term in education, to distinguish it from critical pedagogy.

4.3.4 Critical thinking

Critical thinking is a concept used in education as a desirable aptitude to foster in students. In the late 1980s the importance of critical thinking and the need to formalise its inclusion in school curricula was recognised by educators, prompting the Committee on Pre-College Philosophy of the American Philosophical Association to commission an international group of 46 experts to produce a consensus on what critical thinking (CT) is, and how it might be taught and assessed (Facione 1990)[63]. The expert panel produced a consensus statement:

> *"We understand critical thinking to be purposeful, self-regulatory judgment which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based. CT is essential as a tool of inquiry. As such, CT is a liberating force in education and a powerful resource in one's personal and civic life. [..]" (1990, p3 Table 1)*

Critical thinking is not a method of problem solving, rather a style of reasoning. The expert panel conceptualised it as a set of cognitive skills (which educators can teach) and affective dispositions (which educators can nurture). The cognitive skills relate to tasks within an enquiry (interpretation, analysis, evaluation, inference, explanation) and describe the actions that each skill will enable. But significantly the final skill (self regulation) describes how a critical thinker should question an enquiry itself and modify it accordingly:

> *"Self-consciously to monitor one's cognitive activities, the elements used in those activities, and the results educed, particularly by applying skills in analysis and evaluation to one's own inferential judgments with a view toward questioning, confirming, validating, or correcting either one's reasoning or one's results." (ibid., p19)*

The consensus of the expert panel was also that being adept at the cognitive skills alone was not sufficient to make a student an effective critical thinker; they must also have the disposition to use these skills. According to the panel, a critical thinker is someone who *does* think critically not just

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[63] Google Scholar lists 127 citations of this report, as of 16/5/2008.

someone who *can* think critically. The panel produced a consensus on the disposition of a good[64] critical thinker: "[..] a good critical thinker, the paradigm case, is habitually disposed to engage in, and to encourage others to engage in, critical judgment [..]" (ibid., p24). The panel went on to list several affective dispositions that characterise critical thinkers, including:

- *"open-mindedness regarding divergent world views,*
- *flexibility in considering alternatives and opinions,*
- *honesty in facing one's own biases, prejudices, stereotypes, egocentric or sociocentric tendencies,*
- *willingness to reconsider and revise views where honest reflection suggests that change is warranted."*

(ibid., p25)

So, a critical thinker questions the 'givenness' (to borrow Calhoun's term) of the elements of their enquiries: the way problems and contexts are conceptualised; the evidence and data available; the biases present; the methods and methodologies used; the solution criteria; the conclusions drawn and the reasoning used to support them. Critical thinkers do not automatically accept that the existing situation is relevant and valid, and is open to other possibilities and willing to adopt them when they consider change is required.

Critical thinking is not a fixed method of problem solving; it is "self-regulatory judgment" (ibid.), a style of reasoning that questions itself. A critical thinker engages critically in their enquiries and is critical of their reasoning and results.

4.3.5 Critical pedagogy

Critical pedagogy is a widely used term in education with a large number of educators, theorists and activists involved in its discourse, development and application[65].

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[64] The panel recognised that the notion of a 'good critical thinker' has two possible meanings – relating to the thinker's effectiveness or the thinker's morality (cf ibid. p22-24). The quotation in the text implies the former meaning.

[65] For example *The Paulo and Nita Freire International Project for Critical Pedagogy* has a website including reference literature, user forums and events information and publishes the International Journal of Critical Pedagogy (McGill University 2008).

The Brazilian educator and theorist Paulo Freire is frequently cited as the originator and key proponent of critical pedagogy. Freire's experiences educating financially-disadvantaged farmers in Brazil and Chile showed him that "schooling was often used by dominant interests to validate their own privilege while certifying the inferiority of students marginalized by social and economic factors" (Kincheloe 2008). Moreover Freire suggested that students and teachers needed to become aware of teaching practices' tendency to re-enforce power relationships in order to overcome them. He referred to such practices as following a "banking concept" of education – students conceptualized as empty vessels to be filled with 'deposits' of information, "[the teacher's] task is to 'fill' the students with the contents of his narration – contents which are detached from reality, disconnected from the totality that engendered them and could give them significance" (Freire quoted in Darder, Baltodano and Torres 2003, p57). He saw that such marginalised people often accepted such oppressive relationships as the only possibility – the oppressed come to see the world through their oppressor's eyes " 'I'm just a peasant, or a hillbilly, or a black kid from the ghetto, or a woman, or a man from the Third World, or a student with a low IQ; I have no business in higher education.' " (Kincheloe 2008); and that in recognising other possibilities lay the potential for positive social change – to overcome the restrictions of oppression. Freire referred to students moving from a naïve to a critical consciousness and termed this process "conscientization". "Liberating education consists in acts of cognition, not transferrals of information" (Freire quoted in Darder, Baltodano and Torres 2003, p63).

Following on from Freire, critical pedagogy has been discussed and developed by numerous others such as the work of Henry A. Giroux, bell hooks and Peter McLaren (McGill University 2008, Darder, Baltodano & Torres 2003), and has been applied in many forms, from student-directed classroom projects to heavily political social activism.

Critical pedagogy, then, fits my characterization of Critical Theory. It aims to enlighten marginalized people that their position in society (e.g. as being financially disadvantaged and therefore subservient and inferior to the financially privileged) is re-enforced by their education (e.g. perceiving

themselves as ignorant and 'knowledge-poor', and needing to receive knowledge from the privileged 'knowledge-rich' teacher). And it aims to emancipate these marginalized people by conscientization – making them aware of and reflect upon their situation as not the only possibility and as reflecting an assumed power relationship. This reflection is also action, following the principles of Critical Theory discussed above – theories, in part, constitute our engagement with the world, so to change the world, change the way we think about it.

> *"In an educational context [..] legitimated discourses of power insidiously tell educators what books may be read by students, what instructional methods may be utilized, and what belief systems and views of success may be taught" (Kincheloe and McLaren 2005, p310)*

What and *how* we are taught propagates power relationships. Critical pedagogy recognises that, as such, education is political but employs it for positive ends – enabling students to attain critical consciousness. One strategy for such conscientization involves disrupting the banking concept of education by adopting a dialogical approach (teachers also learn, students also teach) to enable students (and teachers) to become aware of the nature of their oppression (be it based on race, gender, class, sexuality, material worth etc.), and, in recognising alternative possibilities, foster social change.

For example, Duncan-Andrade & Morrell (2007) describe their experience of teaching a secondary English class in an American urban school. They recognised that their students needed to develop linguistic competencies and literary skills to improve their employment prospects and enable civic participation, and that, as such, (amongst other skills) they needed to demonstrate knowledge of canonical literature (such as *Beowulf*, *Canterbury Tales*, and *Heart of Darkness*) in order to advance in the education system. However "other teachers and members of the larger society perceived many of the students [..] as functionally illiterate and lacking in intellect" (ibid.). But Duncan-Andrade & Morrell observed that the same students had sophisticated literary practices associated with their participation in hip-hop culture – memorising lyrics, reading magazines, transcribing songs, composing their own

lyrics. Therefore they taught a poetry unit that paired hip-hop texts with canonical works of poetry. Small groups of students worked with the text pairings and presented comparative analyses of the literary themes within them using whatever method they deemed appropriate (varying from oral presentations to the use of music videos, film clips or interactive activities). In this example Duncan-Andrade & Morrell learned their students' strengths and, using them, encouraged them to develop beneficial skills; and perhaps in doing so, made both students and teachers aware of the limitations and oppression imposed by 'traditional' school-based measures such as test-scores.

Critical pedagogy is a practical application of Critical Theory to achieve definite goals – the education of society to result in a fairer society, education that 'de-marginalizes'. So, how do critical design practices measure up as practical applications of Critical Theory?

4.4 Re-appraising critical design practices

The critical design practices I described earlier have similar characteristics to my characterization of Critical Theory:

- They all suggest that there are contextual factors that affect and situate understanding – i.e. designers', researchers' and users' understanding of how design operates and the role of designed artefacts;
- That the unthinking acceptance of these factors propagates oppression – e.g. maintaining a society of passive consumers; and
- That critiques offer a way of challenging understanding, and therefore afford change – e.g. artefacts (conceptual designs) as critiques, embodying alternative possibilities of understanding; and
- They are all political in that they aim for a more equitable world.

The emotive language of Critical Theory – oppression, coercion, emancipation, enlightenment, freedom etc. – may seem somewhat stretched when applied to critical design practices. Its use in Critical Theory and critical pedagogy reflect their moral and political agenda as a 'liberators of society' (for which they attract criticism – see 4.5, p121). But for design practices this 'liberation' may be on a micro scale (products and systems designed in

response to and allowing a greater expression of humanity) rather than a macro scale (the creation of a fairer society) – although it could be argued the former leads to the latter[66]. While the emphasis is probably weaker, using Critical Theory's language in my discussion of critical design practices suggests this 'liberatory' nature they share.

So, in addition to their explicit claims, I can state that critical design practices derive from Critical Theory. But how well do they relate to the notions of enlightenment and emancipation described above? How could they be seen to differ as practical applications of Critical Theory?

Critical design practices share a common theme for the subject of enlightenment: the effects of a narrow view of design practice and/or its products. Dunne & Raby (1999, 2001) discuss this 'narrowness' in terms of which ideologies designers propagate with effects such as maintaining a society of passive consumers or the omission of "poetic" dimensions in products. In describing reflective design, Sengers (2005) discusses the "blind spots" of existing HCI design and research practices, with negative effects such as "making all of life work". And in critical technical practice, Agre characterises such narrow views as substantive metaphors, which limit the design and research of technical systems (such as, in his experience, AI systems).

Critical Theory proposes enlightenment as the route to emancipation, with critiques as the tools for achieving it. In critical design practices such critiques are used in two senses. Critical design produces artefacts intended to operate as critiques[67] – conceptual designs that embody alternative values and ideologies and thereby prompt reflection on them. In this respect Dunne & Raby (1999, 2001) suggest designing "post-optimal" or "noir" products that are "para-functional", "user-unfriendly", or poetic; but this also includes satirical designs such as Human Beans' "fictional products" (2006). Reflective design also aims to produce artefacts that, in part, operate as critiques – they prompt reflection

[66] Dunne is of this view: "I believe strongly in the potential of industrial design as applied art, or industrial art, to improve the quality of our relationship to the artificial environment, and in industrial design's potential, at the heart of consumer culture, to be subverted for more socially beneficial ends." (1999, p12)

[67] In describing their early critical design work, Dunne & Raby state: "we realised that fundamentally we were critical of the existing options for designers – whether it's mass manufacturing, batch production or whatever – and that the designs we were doing were in effect a critique of what we saw happening at the time" (Icon Magazine 2008).

by their users – but critique is used in another sense: within the research and design process itself. Reflective design involves HCI designers and researchers reflecting on the assumptions and values inherent in their practices to ensure the products of those practices are not limited by them. Critical technical practice also involves a critique of practice within itself – via the creation of alternative substantive metaphors – although it does not produce artefacts as critiques.

The last remaining question from the framework I suggested earlier (4.3.3, p109) is who it is that is enlightened and, therefore, emancipated? For critical technical practice and reflective design it is their practitioners who are enlightened and emancipated, and, to some degree, the users of their products. In these two approaches, the researchers and designers' critical reflection on their own practice broadens it and thereby produces products that could more effectively support (and conceptualise) human lives. The practitioners are no longer 'oppressed' by limited views of their practice and the users are no longer 'oppressed' by the limited possibilities the products of those practices offer.

Reflective design also aims to emancipate the users of its products via another route: using its products as critiques. Critical design operates in a similar manner – its conceptual designs embodying alternative values prompt their users to critically reflect on the possible roles of design and designed artefacts in their lives. On first consideration, then, I could suggest that critical design aims to emancipate the users of its products – users are no longer 'oppressed' by the restricted experiences and world views that affirmatively designed products afford (to borrow Dunne & Raby's term). But there are few users of such critically designed products; most people encounter critical designers' work in galleries or specialist publications (design magazines, academic publications or special-interest web sites). I suggest that the term 'reader' more accurately describes those enlightened and emancipated by critical design. If, referring to Dant's suggestion earlier (4.3.3, p110), critical design produces texts (in the form of artefacts), then emancipation relies on a *reading* of those texts – an intellectual engagement with the embodied ideas[68].

[68] This resonates with Dunne's (1999) description of designers as "authors" and conceptual designs as "genotypes" rather than prototypes, see 4.2.1 (p88).

My concept of 'readers' of critical design raises another question related to my earlier discussion of Critical Theory according to Dant: how do these readers transform the social world? For Critical Theory, the answer relates to Critical Theory's characteristic as a new conceptualization of theory. Theory constitutes the world as well as explains it. So the (Critical Theory) reader transforms the world by thinking about it (theorizing it) differently. Perhaps enlightened, emancipated readers of critical design transform the world by thinking about the role of designed products differently?

This raises the question of instrumentality. How instrumental are critical design practices in fostering the transformation their emancipatory aims suggest? Critical design appears somewhat indirect in this respect – its 'readers' (of its publications and exhibitions) may think about design, its products and their everyday lives differently and then (hopefully) practice design, engage with its products or live their lives differently. Critical technical practice and reflective design are more direct – the reflection of their practitioners directly transforms their practice. I aim for a similar direct instrumentality in my critical artefact methodology, which distinguishes it from critical design and aligns it closer to critical technical practice and reflective design. However where the latter approaches use critical reflection to transform their design and research methods, a critical artefact methodology uses critical reflection to transform the *products* of my design methods (to be more relevant to stakeholders' needs).

4.4.1 The critical in critical artefact methodology

My discussion of critical design practices and their relationship to Critical Theory raises a question regarding the development of a critical artefact methodology: If it employs critical artefacts (such as produced by critical design), and if such 'artefacts-as-critiques' are related to the notion of Critical Theory, what principles from Critical Theory should it include? In particular how should it take account of these principles given that, as I suggest above, a critical artefact methodology differs from critical design in its directly instrumental use of the critical reflection afforded by critical artefacts?

As I outlined at the end of chapter 1 (p29), my critical artefact methodology aims to develop innovative (in the radical, paradigm-breaking

sense) new product ideas that are relevant to a more complete understanding of stakeholders' needs. This requires developing an understanding of stakeholders' needs in the novel situations that such innovative products might suggest. My preliminary work showed that stakeholders had difficulty engaging with novel product ideas because their responses were influenced by their existing experiences. Another way of phrasing this is that stakeholders' understanding of novel product ideas is influenced by their assumptions of what design products *can be* (i.e. their roles, the experiences they afford, the world views they promote, their technical construction). This relates to Critical Theory's notion that understanding is affected by and situated in contextual factors and that these factors are often unknowingly accepted.

As discussed in my characterization of Critical Theory, such unknowing acceptance propagates oppressive power relationships (e.g. Geuss describes this as the "hidden coercion" preventing agents realising their "true interests" see 4.3.3, p109). This wording may be a little strong when applied to a critical artefact methodology, but the sense of it remains – stakeholders (and designers) are 'oppressed' by the limited possibilities of existing products. Enlightenment and emancipation from such oppression is achieved via critiques in Critical Theory. If artefacts are to act as critiques for the same purpose in a critical artefact methodology they should embody an alternative and challenging understanding – i.e. they should suggest different possibilities for design products (e.g. social practices, technical constructions, experiences of use). But crucially for these artefacts to function as critiques, stakeholders must engage with them as *readers* – they should engage with the values, assumptions and ideas inherent in the critical artefacts. Stakeholders might 'read' these elements directly or they might appreciate them tacitly by envisaging the situations and experiences the critical artefacts afford.

Critical Theory recognises that *all* understanding is contextualised – no-one can take the 'umpire's chair' (to borrow Calhoun's term). Reflective design and critical technical practice recognise this by including critical reflection within their practices. For a similar reason it is important that the designer should participate in stakeholders' engagement with the critical artefacts. The designer's understanding of stakeholder needs is subject to their own

unthinking values and assumptions, so to critically reflect on these contextual factors, the designer should participate in the stakeholders' engagement. In this sense stakeholders and designers are *co-readers* of the critiques (the critical artefacts).

4.5 Criticisms of critical theories

Critical Theory, and approaches derived from it such as critical pedagogy, have been criticised for elitism – such criticisms argue that critical theorists place themselves in an intellectually or morally superior position (as they see it) to the rest of society. This criticism could also be levelled at critical design practices, so I will unpick it further and see how it relates to them below.

Critical theories' claim that enlightenment and emancipation are necessary seems legitimate if people are aware of their oppression – the benefits are obvious to those people. Relating to this, Geuss (1981) suggests four "initial states" of society upon which Critical Theory can act:

> *"(1) agents are suffering and know what social institution or arrangement is the cause;*
>
> *(2) agents know that they are suffering, but either don't know what the cause is or have a false theory about the cause;*
>
> *(3) agents are apparently content, but analysis of their behaviour shows them to be suffering from hidden frustration of which they are not aware;*
>
> *(4) agents are actually content, but only because they have been prevented from developing certain desires which in the 'normal' course of things they would have developed, and which cannot be satisfied within the framework of the present social order." (p83)*

In the third and fourth initial states, the benefits of Critical Theory to the people addressed ("agents") are not obvious to them. Geuss' answer to this problem is that it is possible to extract from a society's cultural tradition ideas of 'the good life' which can illustrate to that society's members' how their existing lives differ – i.e. 'the good life' expressed in the products and practices of a society's art, music and religious doctrine is different to real life. These

ideas are often utopian visions of living, and people may be happy to recognise that their life does not match these visions, but Geuss suggests that Critical Theory proposes that their lives may be closer to these visions than they might accept (ibid.).

The works that Geuss refers to does not include all culture. In particular there is a distinction between 'high' and 'low' culture or between 'high art' and 'mass culture' made by the Frankfurt School critical theorists, related to the ideals of the avant-garde, to suggest what cultural forms illustrate 'the good life'. Avant-garde (literally, the advance troops of an army) artists, writers and thinkers aimed to explore new territory for the arts based purely on high ideals (perhaps, the 'metaphysical advancement of humanity'?). Such an avant-garde view rejects mass or mainstream culture as being the product of capitalism; mass culture is 'kitsch' – it may produce artefacts that look like art (e.g. surrealist images in advertising) but they serve the 'low' ideals of profit rather than the 'high' ideals of art. This view has been ascribed to the Frankfurt School[69] – that mass culture is 'bogus culture' as it is produced by a profit-centric culture industry (commercial publishing, the cinema and music industries, television and electronic media), sales figures replace artistic excellence as a measure of worth. So, in this view, 'the good life' can be seen in 'high art' (as it is about high ideals) but not in mass culture (as it is about profit).

An introduction to Clement Greenberg's frequently-cited 1939 essay *Avant-Garde and Kitsch*[70] gives a flavour of why this avant-garde view of high/low culture, seen in Critical Theory, is elitist – it infers that the avant-gardists' aim was to "raise the tastes of the masses". Geuss also gives a sense of this elitism. He refers to Habermas's description of the two effects that Critical Theory can have on society: to reduce identifiable suffering, and (more appropriate to Geuss's third and fourth initial states discussed above) to initiate a "process of self-enlightenment of socialized individuals about what they would want if they

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[69] Wikipedia's entry on the Avant-Garde suggests Adorno & Horkheimer, of the Frankfurt School, make these criticisms of mass culture in their 1944 essay *The Culture Industry: Enlightenment as Mass-Deception.* Available online at: http://en.wikipedia.org/wiki/Avante_garde last accessed 24/11/2008.

[70] Available online at: http://www.sharecom.ca/greenberg/kitsch.html, last accessed 20/11/2008.

knew what they could want" (Habermas, J. and Luhinann, N. (1971) *Theorie der Gesellshaft oder Sozialtechnologie – Was leistet die Systemforschung?* quoted in Geuss 1981, footnote 57 p83). These elements of Critical Theory and the avant-garde imply an elitist attitude to society ('the masses'): 'you don't know what's good for you' and, reading between the lines of this statement, that critical theorists and avant-gardists 'know better'.

Critical pedagogy also appears to have an implicit assumption of 'the good life'. Stevens discusses how critical pedagogy (of the form closely associated with Paulo Freire) has been criticised for its assumption of a grand narrative of liberation/emancipation, i.e. that there is a 'better world' that society *can* and *should* progress towards (2002). She notes how such "meta-narratives" are characteristic of modernist views of the world, and how postmodernism reacts against them in suggesting that all interpretations of reality are subjective and specific. The distinctions between modernism and postmodernism are complex, debatable and beyond the scope of this discussion, however the difference that Stevens points to further illustrates the criticisms critical theories are vulnerable to – 'a better world' is a matter of perspective, 'better' according to who?

An informal rephrasing of critical theories' position on societies unaware of their oppression (Geuss's third and fourth initial states) may help to summarise the criticisms discussed above; namely it is as if critical theorists are declaring to the world:

> *"Your lives are shallow and dull, and you have low aspirations; we can show you how to live better lives – what you have and/or think you* could *have are no good for you, we can help you see what you* should *want."*

Such a statement assumes that societies (the particular people addressed by a Critical Theory) need enlightening, more specifically that they would benefit from enlightenment in a sense they themselves could appreciate (rather than in abstract terms such as a 'fairer society'). It also assumes that there is a concept of a 'better world' that everyone can recognise and agree to; whereas what is 'better' is relative and depends on each individual's interpretation – who is qualified to say what is 'better'? And in this respect of 'better', the statement

assumes that people are unaware of the oppression caused by their 'low'/mass culture; whereas people may be perfectly capable of rationalising the values in their culture – "we know it's about profit, we're not stupid". Finally, although there will be societies who are unaware of their oppression, it may be a mistake to classify all those that do not feel themselves to be suffering as oppressed, and consequently in need of enlightenment. Doing so puts the qualification of oppression (and the 'good life'/'a better world') in the hands of the critical theorists, when it is arguably of most meaning to the societies' members (ultimately, the subjects of oppression and beneficiaries of emancipation).

Critical theories' enlightenment and emancipation of societies then seems most defensible where the oppression is clear to those societies' members. This is often the case in critical pedagogy – such as Freire's Brazilian farmers who could clearly appreciate their social and financial disadvantages (see 4.3.5, p113). Enlightenment and emancipation is a more controversial strategy when it involves the critical theorist's ideals of 'the good life' or 'a better world' and their assumption that society is oppressed by not sharing them. Critical design is susceptible to this latter position. For example, Dunne (1999) suggests products should have "poetic dimensions" but we might prefer our electronic products 'shallow' and functional[71]. Reflective design and critical technical practice are less vulnerable in this respect: both approaches suggest researchers and designers recognise the limitations of technical systems' design but neither suggests that they have the ideal replacement. For example Agre (1997) discusses the limitation of all substantive metaphors, rather than suggesting an ideal, all-encompassing metaphor (a 'better world') (see 4.2.4, p100).

A critical artefact methodology does not succumb to the same pitfall as critical design. Its end results are not intended to relate to an idealised 'better world', rather they aim to be innovative product ideas (of the novel, paradigm-questioning sense) relevant to stakeholders' needs. A concept of 'oppression' is present, in the form of the stakeholders' and designer's limited comprehension of possibilities for products, but crucially the results produced relate to the designer's *and* stakeholders' notions of 'better' – the results' relevance is judged

[71] Dunne may be buying into the flattering portrayal of designers implied by the avant-garde: of knowing what is 'better'. As a designer, he may not be alone in this respect.

by the stakeholders as interpreted by the designer[72]. Critical design's 'better world' may be 'better' in the sense of a wider, unrestricted range of possibilities for design practice and products. But in having the critically designed artefacts as the end point (or the critical reflection they afford) critical design is vulnerable to a charge of elitism – who is to say their 'better' is what society wants or agrees with? In using critical reflection more instrumentally, a critical artefact methodology avoids this criticism. The designer is not suggesting what's 'better' (as could be said of critical design), rather designer and stakeholders *together* are working out what is *relevant.*

4.6 Conclusion

In this chapter I have discussed how critical design practices share features with Critical Theory, as expressed by my characterisation of it. In particular:

- That they share a view that the current research, design and use of (for example) electronic products, HCI systems or AI systems in some way 'oppresses' their researchers, designers and users (such as making them passive consumers or unquestioningly accept a product's use);
- That enlightenment of the assumed or hidden factors affecting research, design and use emancipates these people; and
- That an engagement with 'artefacts-as-critiques' ('critical artefacts') as *readers* leads to this enlightenment and emancipation.

I then discussed how a critical artefact methodology could use critical artefacts as part of developing radically innovative product ideas. Specifically how 'artefact-as-critiques' could be used to overcome designer's and stakeholders' limited view of product possibilities, and how their operation in this sense depended on designer and stakeholders engaging with critical artefacts as *co-readers.* Finally I suggested that this collaboration between designer and stakeholders frees a critical artefact methodology from the criticism of elitism – critical artefacts are part of a process of designer and

[72] This relates to the idea of designing as processing stakeholders' engagement that I will discuss in 6.2.4 (p171).

stakeholder agreeing what product ideas are *relevant*, not as implications for 'a better world' as defined by the designer (as could be said of critical design).

Through this chapter, and chapter 3 preceding it, I have investigated which aspects of existing theory and practices a critical artefact methodology can draw from. But, as noted in chapters 1 and 2, I also developed my understanding of how a critical artefact methodology could operate via attempting to use it in live design and research projects with groups of stakeholders. I will discuss this practical work in the next chapter.

5 Practical work

5.1 Introduction

I described in chapter 1 how my use of critical artefacts in the preliminary work developed my understanding, as a designer, of that design project (novel product ideas for digital photograph collections). The effectiveness of such an approach in that context suggested to me that the critical reflection which critical artefacts afford could be used instrumentally within human-centred design – a critical artefact methodology – as a way for designers to develop their understanding of stakeholder needs. In my earlier discussion (see 1.8, p29) I set out some basic features of such a methodology, namely that:

- It fits within the paradigm of human-centred design;
- It is directed towards innovation;
- Stakeholders participate in discussion workshops;
- These workshops centre on the presentation of conceptual designs;
- These conceptual designs consist of artefacts and usage scenarios;
- Presenting critical artefacts, the products of critical design, enables stakeholders to engage with novel situations;
- The designer participates in the discussion workshops, and this participation somehow builds their understanding of stakeholders' existing, future and latent needs in the context.

However I required empirical data to develop generalisable methods utilising critical reflection in this way, in particular evidence of the principle working well – stakeholders engaging with critical artefacts in a manner that usefully developed the designer's understanding. This could be used to build my understanding of how the principle could be applied effectively and hence define a critical artefact methodology.

This chapter describes two attempts of implementing critical artefact methods in order to provide this 'data'[73].

The first project, *Living Rooms*, suggested several factors which could affect stakeholders' effective engagement with critical artefacts, and hence the efficacy of the methodology. Most of these factors were relatively straightforward to deal with, however one factor needed further consideration. This factor, selecting suitable stakeholders to participate in the engagement activities, raised the question of how to identify 'suitable participants'. Von Hippel's notion of lead users offered a framework in this respect, and is discussed further below.

The second project, *Digital Mementos*, took account of the *Living Rooms* factors and the effectiveness of its stakeholder engagement activities provided evidence of the factors' importance.

In both *Living Rooms* and *Digital Mementos* the development of a critical artefact methodology was subsidiary to the principal aims of the projects' lead investigators. However in both projects I devised and managed the stakeholder engagement activities and was therefore able to ensure they were directed towards the research aims of this PhD.

5.2 Living Rooms

The preliminary work had demonstrated a use of critical artefact methods with a small group of similar stakeholders and a single designer – myself. To develop generalisable methods, and a critical artefact methodology to support them, I sought a project where they could be applied in a more general form – with a broader group of stakeholders and the involvement of other designers. The *Living Rooms* project provided this opportunity.

Living Rooms was a 12-month project commenced in late 2006, funded by the UK's Strategic Promotion of Ageing Research Capacity (SPARC) initiative[74], which aimed to directly inform the ongoing work of Lab4Living – then a planned research collaboration between the Art & Design and Health &

[73] The nature of this 'data' and how it relates to my research methodology is discussed further in chapter 2 and re-visited in chapter 7.
[74] See http://www.sparc.ac.uk/ , last accessed 21/1/2009.

Social Care research centres at Sheffield Hallam University. This contribution was in two forms: firstly as a preliminary investigation into how the design of the home could support independence and quality of life as healthcare needs, lifestyles and aspirations changed with age – the design of the home for 'tomorrow's older people'; and secondly as an investigation into methods of engaging with stakeholders. The former would identify opportunities for future Lab4Living research projects and the latter would inform the development of a set of methods, resources and environments for involving stakeholders in those projects in an effective manner.

The project was led by Professor Paul Chamberlain, one of my PhD supervisors, and I was responsible for devising and managing the engagement activities the stakeholders would participate in. We selected my critical artefact methods as the basis for these activities as they furthered our joint research interest in the use of artefacts in engaging with stakeholders (Chamberlain and Bowen 2006) and provided me with an opportunity to develop and evidence a critical artefact methodology.

5.2.1 Pilot study: *Homes for Life*

Prior to *Living Rooms* I conducted a short pilot study to test how I might apply critical artefact methods in a different context. This study, *Homes for Life*, explored a similar context to *Living Rooms* (designing for an ageing population) but with a smaller and narrower group of stakeholders - eight members of Sheffield's University of Third Age (U3A). The results of this pilot study suggested critical artefact methods could be usefully applied in such a context, developed Chamberlain's and my interest in designing for an ageing population, and supported funding bids – including that for *Living Rooms*.

5.2.2 Project participants

Thirty four Sheffield people participated in the project, chosen to represent four broad groups of stakeholders: 'future old', 'active old', 'frail old'[75] and

[75] We recognised that these stakeholder group names are problematic if taken literally. How do you define 'old', frailty or 'active-ness'? Our approach was to select participants whose circumstances meant they would likely have the types of experiences and needs we wanted to inform our design understanding. But recognising that this meant the group names were purely

carers; with between four and eight participants in each group. An additional 'active old' group participated in the final phase of activities to provide a 'control group' who saw the final artefacts without participating in the discussions that informed their design.

Each stakeholder group participated separately in a series of three one-hour discussion workshops spread across four months (with the exception of the control group who only participated in one workshop). The workshops were video recorded for later reference. Chamberlain and I participated in all the workshops (excepting two workshops where I participated alone) and acted as the 'lead designers' in the creation of the subsequent conceptual designs. Four other designers were effectively 'sub-contracted' to assist in devising the artefacts but did not participate in the workshops (current and recently completed postgraduate design students at Sheffield Hallam University). A colleague from the Centre for Health & Social Care Research (with expertise in care management for older people and vulnerable adults and experience of working with local authority care services and voluntary organisations) assisted with recruiting the stakeholder groups and sat in on four workshops as an observer.

5.2.3 Project process

The project followed the basic features of a critical artefact methodology as outlined at the end of the preliminary work (p29 and repeated in the introduction above).

The workshops were described to stakeholders as a 'dialogue' between them as 'users' and the investigators as designers. The first workshop was presented as 'us [the designers] listening to you' and stakeholders were asked to talk about two objects from inside their homes (or photographs of objects if they were too large or valuable to bring): a 'favourite' and a 'nuisance (but

'placeholders' not prescribing the characteristics of their members. For example the 'frail old' group were residents of an apartment block that provides extra care facilities. It was therefore reasonable to expect several of them to have more advanced health care needs than older people living independently. However they then represent the views of residents of an extra care housing scheme, not of 'frail' older people in general.

necessary)'. The ensuing discussions formed part of the inspiration for the development of critical artefacts to be presented in workshop two.

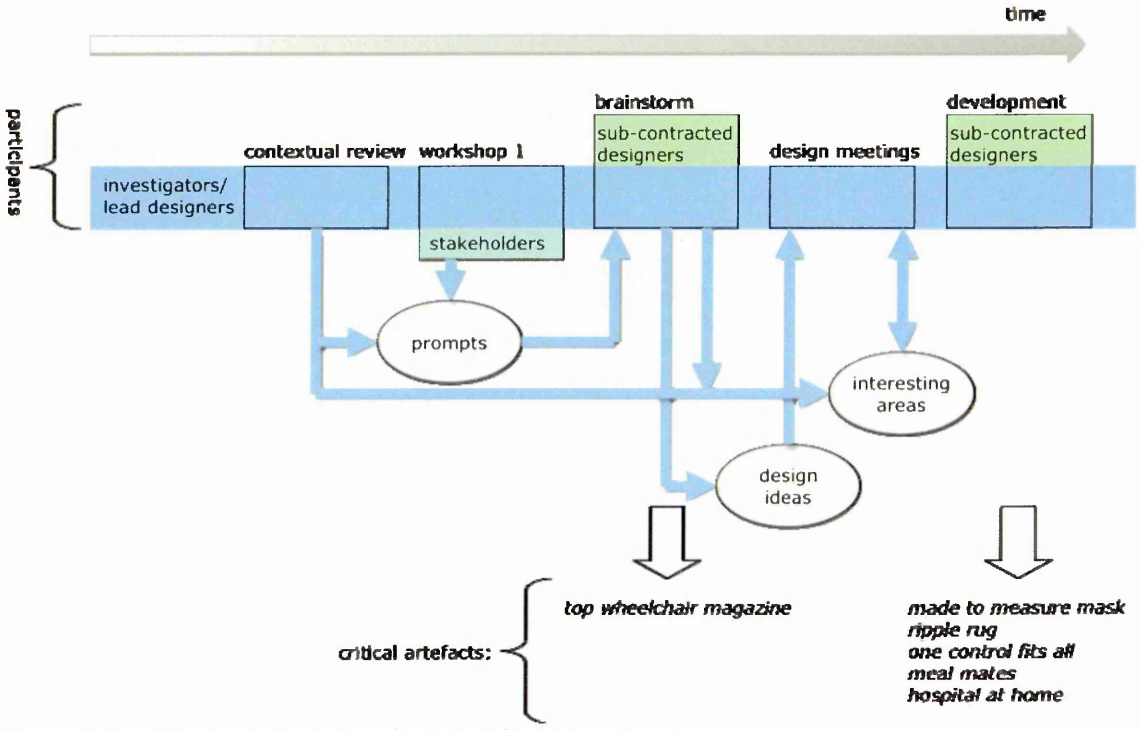

Figure 5.1 critical artefact development in Living Rooms:
activities (in boxes), participants (shading) and ideas (ellipses)

Previously, when I was the sole designer, the development of critical artefacts was a relatively simple creative process: reflecting on insights from the first workshop and a contextual review. A more complex approach was required to work with other designers, as illustrated in Figure 5.1. Prompt cards were produced in response to the first workshop insights and contextual review that were then used in a brainstorming session. This session began with me giving a short presentation outlining the principles of critical design. The brainstorm yielded several ideas that were developed into a set of critical artefacts – some by two of the 'sub-contracted' designers (under direction from Chamberlain and me) and some by myself. From this set Chamberlain and I selected five critical artefacts for presentation in workshop two that we felt would be most useful in furthering our enquiry. A parallel process of developing an understanding of interesting areas for enquiry and developing design ideas that expressed and explored these areas took place, followed by a narrowing down of these ideas to focus onto what we considered promising lines of enquiry.

The second workshop was presented to stakeholders as 'us [the designers] talking back' using several conceptual designs – the conceptual designs being the critical artefacts which were presented to the groups via a series of images in a projected PowerPoint presentation.

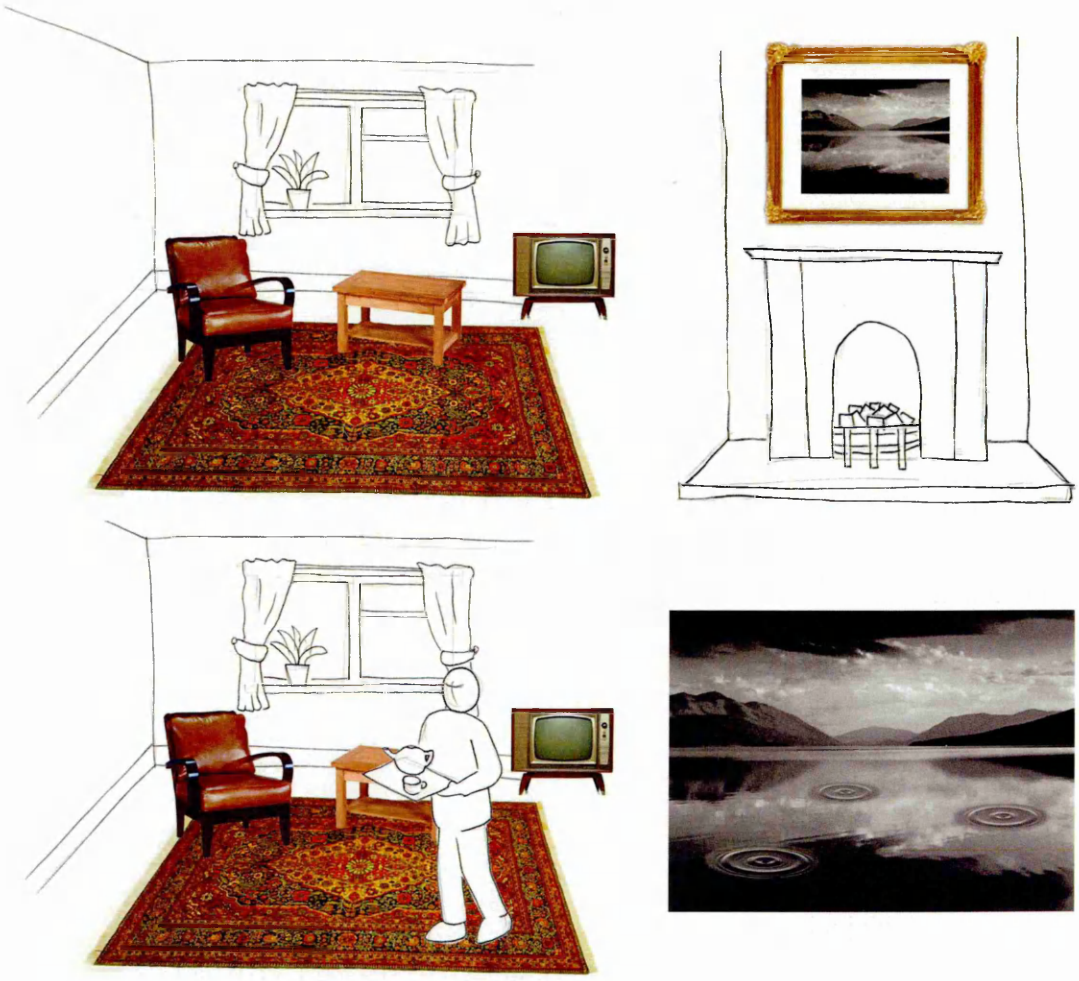

Figure 5.2 images from the *Ripple Rug* presentation

For example *Ripple Rug* (Figure 5.2) comprises of an ornamental rug with pressure sensors embedded within it to send signals to a picture in another location. When an older person moves across the rug in their home it causes ripples to appear in the picture at a family member's home, the ripples expanding and fading over time. Thus the family member can infer the wellbeing of the older person by watching the picture.

Each conceptual design was presented individually and then the stakeholder groups were prompted to share their opinions of them and explore the situations and possibilities they suggested. The conceptual designs were

described as 'conversation starters' rather than practical proposals – 'starting points for debate'. Stakeholders were not explicitly told that the concepts were the products of critical design or intended to deliberately provoke.

Following the second workshop discussions, the artefacts for workshop three were devised in a simpler process. Chamberlain and I met over several days to reflect on the workshops via an extended discussion using sketch pads and conversation to explore the implications and the opportunities for design. This discussion was based on our individual recollections of the workshops and we did not review the video recordings at this stage. As part of this process we developed a further set of conceptual designs which continued to explore the areas we chose to focus our enquiry within, but were intended to be closer aligned to the stakeholders' needs as we understood them and consequently less provocative. These 'revised' conceptual designs were not refined versions of the critical artefacts according to stakeholders' comments. Rather they were new conceptual designs expressing our developed understanding of the design context as informed by the second workshop discussions.

Three revised conceptual designs were presented in the third workshops, which were described to stakeholder groups as 'continuing the conversation'. The conceptual designs were again described as 'conversation starters' rather than practical proposals. A PowerPoint presentation was used again, and one of the postgraduate student designers was involved in producing physical models of two of the artefacts.

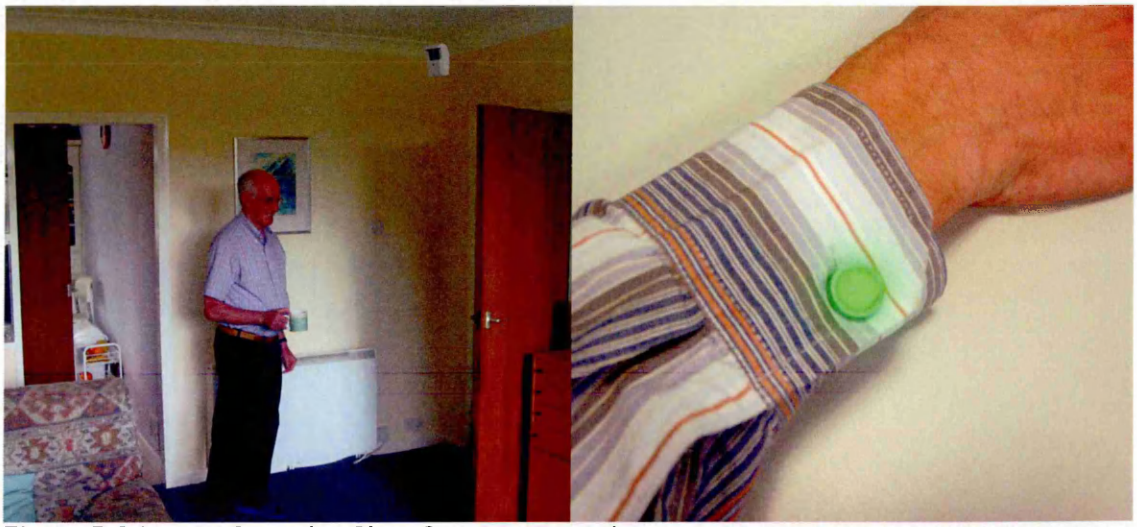

Figure 5.3 images from the *Glow Gems* presentation

For example *Glow Gems* (Figure 5.3) are small devices that can be worn as jewellery (such as a cufflink) that glow in changing colours in response to signals from an infrared movement detector (akin to those used in burglar alarms); the detector being placed in an older person's home and the gems worn by their relatives and/or friends. Although dealing with similar issues to *Ripple Rug*, this concept was devised to be more relevant to stakeholder needs as we understood them – such as a receiving device easy to carry around for those with busy lives.

The end point of the implementation of a critical artefact methodology in *Living Rooms* (the end of the investigation into the design context) was taken to be Chamberlain and my reflections on the third workshop discussions – specifically whether the stakeholder discussions validated our understanding as embodied in the revised conceptual designs; whether the stakeholders recognised the conceptual designs as relevant to their needs.

5.2.4 Effectiveness of the implementation

The use of critical artefact methods in the *Living Rooms* project did enable Chamberlain and me, as designers, to develop a greater understanding of the context (designing for 'tomorrow's older people'). This was expressed in the form of revised conceptual designs that the stakeholders recognised as relevant to their needs and in the identification of key themes for future enquiry via the development of further conceptual designs. For example *Ripple Rug* and *Glow Gems* enabled us to identify interesting lines of enquiry around the design of devices that monitor wellness (as opposed to problem alarms) and devices with deliberately minimal interfaces[76].

However, compared to the preliminary work, the implementation in *Living Rooms* did not appear to be as effective – I was concerned that the manner of the stakeholders' engagement with the critical artefacts was less useful in informing the designers' (our) understanding than in my previous experience.

[76] These findings relate to our design investigation and, as the focus of the thesis is the development of the critical artefact methodology not the results of its application, they are not discussed here. However the findings are discussed further in Bowen & Chamberlain (2008).

The aim of using critical artefacts is to prompt stakeholders to critically reflect on their experiences, practices and their assumptions about the role of designed products within them (see 4.4, p116). This depends on stakeholders engaging creatively with the situations, experiences, values and needs that the artefacts suggest rather than a more mundane evaluation of the artefacts' resolution; thinking 'outside the box' rather than evaluating appearance, function or cost. In general Chamberlain and I had to 'work harder' to get this desired type of stakeholder engagement with the critical artefacts. Stakeholders were often dismissive of conceptual designs and on several occasions we had to steer their conversation away from tangential themes or mundane evaluation to thinking about wider issues.

Reflecting on my experiences in both projects I suspected several factors could be affecting the stakeholders' engagement, in three broad areas: the conceptual designs; the participating stakeholders; and the workshop environment.

5.2.4.1 Conceptual designs

The manner of the conceptual design's presentation could affect stakeholders' engagement with them. Two of the conceptual designs (*Made to Measure Mask* and *Hospital at Home*) were illustrated via a series of images to describe the experience of using the systems portrayed. Although the sequence of images told a short story of the critical artefacts' use, there was no personalisation or characterisation of the characters involved. Two of the conceptual designs (*Ripple Rug* and *Meal Mates*) were illustrated via a sequence of images to describe the operation of the systems portrayed, with no 'story' elements. The remaining two conceptual designs (*One Control Fits All* and *Top Wheelchair*) were illustrated with images of the products alone, again with no 'story'. Where illustrated, people were abstracted – via line tracings of photographs or simplified drawn figures – to make them 'neutral', i.e. it would be difficult to make assumptions about lifestyle, class or ethnicity.

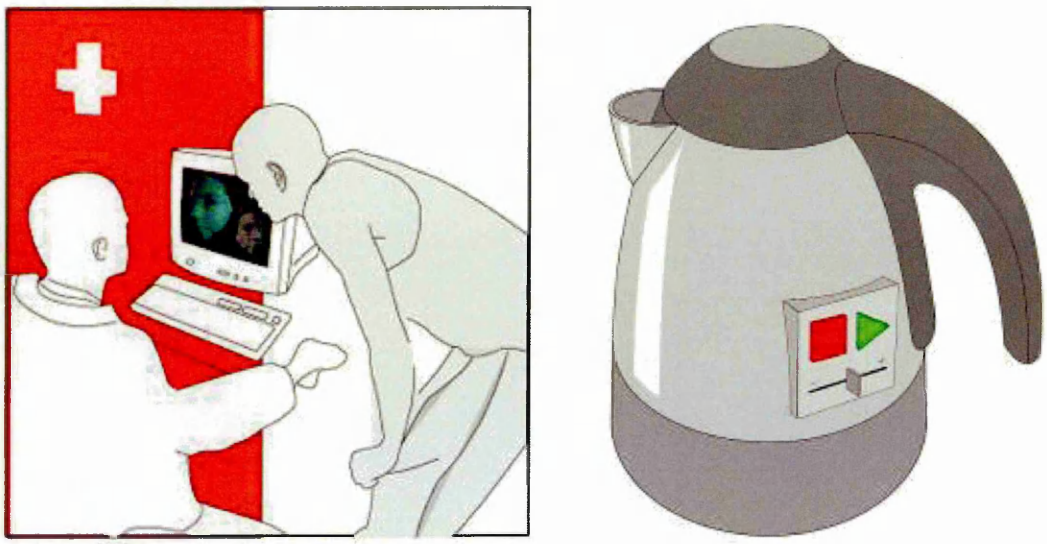

Figure 5.4 images from *Made to Measure Mask* and *One Control Fits All*

Perhaps stakeholders could not envisage the conceptual designs in *Living Rooms* well enough because they were non-specific and impersonal, and consequently their engagement was limited? In chapter 1.6 (p24), I discussed using scenarios to allow people to comment on beliefs and values via another person's experiences. But this may be difficult if this 'other's experience' is not sufficiently vivid. In short, the concepts may not have 'come alive' for the stakeholders. This suggests that the scenarios used in the conceptual designs should be specific with believable, rich characters and social situations[77].

The conceptual designs may not have been sufficiently provocative to prompt critical reflection. In *Living Rooms* stakeholders recognised similarities between the social practices and products suggested in the conceptual designs and familiar practices and products. They tended to offer anecdotes about existing practices and products or evaluate the conceptual designs against them, both of which were less desirable in opening up the discussion. For example, *Made to Measure Mask* prompted discussion about the UK health service's inadequate provision of breathing aids rather than the potential of mass-customisation that was intended. This was less of an issue with the preliminary work where the conceptual designs suggested radically different

[77] In fact in the following third *Living Rooms* workshops a deliberate effort was made to present more personalised, specific scenarios for conceptual designs. This entailed providing more details in the narratives, using staged photographs of real people and more developed fictional characters interacting with the artefacts.

products and practices – for example a system enabling a mother to display anger at her son by wiping out all photos of him on display (*Forget Me Not Frame*, see 1.4, p20). This suggests that the conceptual designs should contain social practices and/or products that are somehow novel.

As noted in the introduction, a critical artefact methodology is directed towards innovation in a radical, paradigm-questioning sense rather than gradual, step-wise innovation (see 1.8, p29). Such innovative products create novel situations that, I suggest, stakeholders can engage with via critical artefacts. So, if critical artefacts are to allow stakeholders to engage with these novel situations they should themselves suggest novel situations. Using the novel situation of what *might* be to explore the novel situation of what *should* be.

The conceptual designs also may not be sufficiently provocative because they were, in part, created by designers inexperienced in critical artefact methods. Could this collaboration have 'diluted' the critical artefacts? The two 'sub-contracted' designers were both embarking on design careers after University education and had yet to generate a large portfolio of professional work. Perhaps they were therefore overly anxious to produce work of a 'professional standard' – practical proposals with high quality presentations rather than provocative, conceptual designs? Chamberlain and I, on the other hand, did manage to collaborate effectively but it may be significant that we both participated in the stakeholder workshops while the 'sub-contracted' designers did not[78]. Whether collaboration was an influence or not, what is more significant was that I was still unclear of the operation of a critical artefact methodology in *Living Rooms*, so it was perhaps too soon to be involving other designers.

The conceptual designs were presented as 'conversation starters', but was stakeholders' engagement limited because we did not admit to their critical nature? Were stakeholders dismissing designs embodying alternative values and ideas because they expected to be evaluating practical proposals? A balance

[78] Designers' participation in workshops supports the use of designing to 'process' stakeholder discussions and develop their understanding of the problem context, which I will discuss in 6.2.4 (p171).

appears to be necessary here. Critical artefacts function because the alternative values and ideas they embody prompt their viewers to re-consider their own values and assumptions. Their 'strangeness' is key so admitting they were explicitly designed thus could reduce their effectiveness. However this 'strangeness' could cause viewers to dismiss conceptual designs outright. Perhaps the balance is to present the critical artefacts and scenarios as starting points for discussion, admit that they may be provocative or strange and ask stakeholders to explore why this might be so.

5.2.4.2 Participating stakeholders

The stakeholders themselves may have affected their own engagement. Firstly they may not have recognised the possibility of engaging with the critical artefacts in a more open, creative manner. They may have needed some form of exercise in 'anything's possible' thinking to enable them to engage imaginatively with the artefacts rather than a more mundane evaluation of them[79].

Secondly although the stakeholders used their rich personal experiences in engaging with the critical and revised artefacts, they were sometimes dismissive of some ideas because they did not have the same appreciation of the design context as the designers. For example we were aware that the increasing proportion of older people meant it is necessary to explore proposals to care for older people with fewer carers; however stakeholders often dismissed any proposals that reduced human contact. This suggests that educating stakeholders about the design context itself would be beneficial.

Thirdly we may have been using stakeholders who were not best suited to this kind of activity - people who do not easily engage in creative thinking and

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[79] In his research project the designer Graham Whiteley (2000, p32-36) needed a group of amputees to engage with his novel designs for artificial limbs. However the amputees' very negative perceptions of the ability of prostheses to provide good quality aids coloured their attitude to any discussions of technology. For example they were unable to conceive of a prosthesis which could be both aesthetically and mechanically satisfying. To help the group overcome their narrow perceptions Whitely showed them a series of clips from well-known science fiction films to remind them that they had once believed that anything might be possible. After seeing this material and the novel prototypes emerging from the project the participants' discussion was more open and acknowledged needs and possibilities not discussed earlier.

are less likely to explore solutions to their own problems. This last factor is somewhat controversial as it goes against the inclusive aspect of much human-centred design.

5.2.4.3 Workshop environment

The environments in which the conceptual designs were presented, both physical and social, could affect stakeholders engagement; in particular the workshop settings and the personal relationships between the stakeholders. For example the 'active old' group workshops were held in a church hall where the participants met regularly as a community group and for fitness activities. They could reasonably be said to be friends, and were used to meeting each other in a situation centred on enjoyment and socialising. The carers group were members of Sheffield's 'Expert Elders' network and their workshops took place in a conference room in a Sheffield council building they were likely to be familiar with. As 'Expert Elders' they were accustomed to offering opinions based on their experiences and having this consultation valued. They were also acquainted with each other but not necessarily close friends.

The contrasting environments of the two groups could therefore influence their expectations of and behaviour in the workshops. The 'active old' workshop was an extension of their social activities; their discussions were friendly, mutually supportive and humorous. The carers' workshop had a 'work' connotation; they were focussed on pragmatic discussions and practical outcomes. The workshop environment of the 'active old' group appears more conducive to the open, creative engagement with the critical artefacts that I require. It would be difficult to control all the variables affecting workshop environments, so perhaps it is sufficient to suggest that workshops should be in an informal, relaxed setting – again, both physical and social.

5.3 Implications from *Living Rooms*

When the implementation of a critical artefact methodology in *Living Rooms* did not work as well as I had hoped, I reconsidered the relative success of the preliminary work. Consequently it appeared that several factors might affect the efficacy of the critical artefact methods that I then needed to test in

another implementation of the methodology. The factors suggested implications for this next implementation in three areas:

1) Conceptual designs:
    a) The scenarios used should be specific with believable, rich characters and social situations;
    b) The critical artefacts and associated scenarios should suggest novel situations – social practices and/or products that are somehow novel rather than being similar to existing practices and products;
    c) Until I am clear on the operation of the methodology, generate critical artefacts alone;
    d) Don't present the conceptual designs as practical proposals, rather starting points for discussion. Admit that they may be provocative or strange and ask stakeholders to explore why this might be so.
2) Stakeholders:
    a) Exercise stakeholders' open-minded, 'anything's possible' style of thinking – so that they can engage imaginatively with critical artefacts;
    b) Educate stakeholders in the context – so that they can engage subjectively in the context, in an informed manner;
    c) Select 'suitable participants' – those easily able to engage in creative thinking and those who are interventionists.
3) Workshop environments: ensure the workshops are conducted in an informal, relaxed setting.

Strategies for dealing with most of these implications are relatively straightforward, and I will discuss them further later. However devising a strategy for selecting 'suitable participants' requires more thought. How can suitable stakeholders be characterised and identified from this characterisation? What characteristics are best suited to a critical artefact methodology's engagement activities?

Assuming the other implications have been dealt with, during the engagement activities I need stakeholders to:

1) Envisage the critical artefacts scenarios and consequently express their thoughts and feelings about what it would be like to 'live' these experiences rather than focussing on their resolution (form and function);

2) Recognise solutions (proposed designs) relevant to their needs in novel situations.

I do not specifically need stakeholders to be co-designers (although not an unwanted trait, it is not central to what is required). So, this suggests that stakeholders more likely to engage usefully in the engagement activities are:

1) Imaginative people, able to envisage themselves in fictional scenarios.
2) People in tune with the possibilities of novel situations.

The notion of 'lead users' may offer a way of identifying such stakeholders.

5.4 Lead users: suitable participants?

In management science the concept of lead users and their relationship to innovation has been developed and explored since the 1980s. This body of theory began with an investigation by Eric von Hippel (1986, 1988) into the functional sources of innovation in the late 1970s and early 1980s where he discovered that, in certain fields, users[80] rather than manufacturers were frequently the sources of innovation. In developing this theory, von Hippel observed that particular kinds of users are likely to innovate. He suggests such "lead users" can be identified as having two characteristics, revised and refined to:

> *"(i) lead users expect attractive innovation-related benefits from a solution to their needs and so are motivated to innovate, and (ii) lead users experience needs that will become general in a marketplace, but experience them months or years earlier than the majority of the target market" (von Hippel 2007, p300)*

Lüthje & Herstatt (2004) have termed these characteristics *motivation* and *capability* respectively. In earlier papers von Hippel discusses the motivation characteristic in terms of financial benefit – lead users innovate for profit. Latterly (2007) he has observed that this benefit is more complex and may be related to the benefits of *overall* innovation across the field rather than profits from their specific innovation – for example the increased reputation of an open-source software developer leading to more commercial work. Although

[80] 'Users' here refers to companies as well as individuals, for example a printed circuit board manufacturer is the user of computer software for designing and making printed circuit boards.

von Hippel's idea of motivation is still economic, in the same paper he admits "users expecting significantly higher economic or *personal* benefit from developing an innovation [..] are more likely to innovate" (ibid., my *emphasis*).

I have noted above that certain stakeholders have difficulty engaging with the novel scenarios presented in critical artefact workshops. Von Hippel notes that most users' responses to new product ideas are constrained by their experiences. Whilst in slow moving fields such "typical users" (1986) may be able to usefully participate in product development, where the pace of change is fast he suggests "users steeped in the present are thus unlikely to generate novel product concepts which conflict with the familiar" (ibid., p791). He goes on to show that lead users are an effective resource for market research in such situations where typical users are not. Could lead users then be more useful workshop participants in my critical artefact methods? And how could the two characteristics of lead users be used to identify such people?

The lead users' capability characteristic is due to them being at the leading edge of markets (Morrison, Roberts & Midgley 2004). They experience needs ahead of the majority of users, but crucially these are needs that the majority will experience in future. This experience of future needs is valuable in participants for my critical artefact approach. As part of a human-centred design process it aims to develop an understanding of real stakeholder needs (to ensure the final designed products take account of them). In the novel situations where I suggest my approach is appropriate these are likely to be future needs. Lead users' leading edge experience makes them ideally qualified to judge the relevance (or not) of any design solutions presented to them. They may recognise future needs addressed by the artefacts presented or their engagement with the artefacts may give the designer more implicit insights into future needs.

I suggested above that imaginative, open-minded people might make useful participants for my approach. At first sight then lead users' motivation characteristic might be relevant. People who innovate must be creative thinkers? But the characteristic defines lead users as those motivated to innovate as they "expect attractive innovation-related benefits" (von Hippel 2007). Lead users innovate for gain rather than because they are creative

thinkers (although they may be creative thinkers too). So it is problematic to use lead user characteristics as an indicator of open-minded, imaginative people.

However von Hippel (2005) has shown that not only are lead users *likely* to innovate, large proportions *do* innovate. This experience is valuable in potential participants. Firstly, by innovating, lead users may have learned or improved their creative thinking skills. Secondly their experience enables them to engage constructively with any potential solutions. They may evaluate them in relation to their own attempts in similar situations, such as considering: "is this how I would do it?"; "how does this compare to my solution?"; "could you try X solution instead?".

Lead users would then appear to be promising workshop participants. But, in selecting stakeholders based on lead user characteristics, the critical artefact methods could be criticised as elitist – the design ideas would be produced from an engagement with a biased selection of stakeholders. Human-centred design aims to produce products that answer the needs of their broad group of stakeholders (cf discussion in 1.7, p26). Can my critical artefact methods claim to be human-centred design if they use a restricted set of 'lead user stakeholders' with very particular experiences different to the majority? The purpose of my critical artefact methods and the role of stakeholders within it suggest that they can.

As outlined in 1.8 (p29), a critical artefact methodology is directed towards radical (as opposed to gradual) innovation. My critical artefact methods aim to produce innovative product ideas that answer future or latent needs. I have suggested above how lead user's experiences of future needs (and, often, of dealing with them) may allow them to engage with such innovative product ideas – to be in tune with the possibilities of the novel situations that these ideas suggest. Von Hippel (1986) has also developed strategies for using lead users in market research. He observed that lead users are often the driving force of innovation within their fields so, in order to innovate, use lead users as a resource. As such, in von Hippel's market research strategy and my critical artefact methods, lead users' role is not to represent a stakeholder community

completely, rather to foster innovation as the members of that community most likely to innovate.

So, critical artefact methods employing 'lead user stakeholders' can form *part* of a human-centred design process if that phase is associated with innovation. As von Hippel has suggested, lead users' characteristics make them better qualified than 'typical users' to foster innovation. The product ideas that critical artefact methods produce could be criticised as reflecting the narrow experiences of a particular group of stakeholders (lead users). However the capability characteristic specifies that, although lead users do experience needs different to the majority (future needs), the majority *will* experience these needs in due course. It is therefore legitimate to use lead users if their experience of future needs is valuable, as it is in fostering innovation. Later phases of the design process might include a more representative sample of stakeholders to resolve the design ideas into finished products that could then be said to be 'human-centred'.

Further, as not every product or technology has lead users (who can then foster innovation), critical artefact methods can only use lead users in certain contexts. Von Hippel's (1988) earlier studies confirmed that innovation by lead users tended to be confined to products characterised by a rapid rate of change. He has latterly suggested (2005) that user-led innovation is more likely in areas where there is a greater heterogeneity of needs – individual users have specific and different needs to their peers. For example Luthje et al. (2005) showed that mountain bike enthusiasts have a high heterogeneity of needs. Although they all use bicycles on off-road terrain, there are numerous different sub-specialities: downhill riding, night riding, riding on ice or with single-speed bikes for example. Each cyclist is likely to have their own different needs according to their sub-speciality and riding style. Numerous users with different needs and an industry with a fast pace of change mean it is unlikely that a manufacturer will produce solutions for each need. Hence lead users arise having the capability and motivation to innovate.

So lead user participants can only be drawn from contexts where there is either a rapid rate of product change and/or a high heterogeneity of user needs. In both cases the critical artefact scenarios are likely to be novel to

stakeholders – the diversity of their needs means that proposed solutions are unlikely to match them closely and the rapid rate of product change means that new proposals will bear little resemblance to existing products. This re-enforces the suggestion that the critical artefact approach is best applied in such contexts.

To re-cap, in my participants I require people who can give me insights into future needs. User needs in contexts that, for the majority, do not yet exist. Lead users fit well in this respect. Secondly my approach requires people who will engage with my critical artefacts creatively – open-minded, imaginative people who are prepared to challenge the values and norms underlying existing products by placing themselves in the alternative realities the artefacts suggest. I don't explicitly require co-designers. Lead users' tendency to innovate may make them better creative thinkers, but as noted earlier, matching the lead user characteristics alone is not a good measure of such creativity. So I need to look for other characteristics to select open-minded, imaginative participants.

5.5 Digital Mementos

I felt the critical artefact methods were not as effective in the *Living Rooms* project as in the preliminary project work. My experiences of participating in *Living Rooms* suggested some factors that could affect the efficacy of the critical artefact methods. I therefore needed another project that would allow me to verify these factors and also gather evidence of critical artefact methods working more effectively to form the main 'data' of my research. *Digital Mementos* was such a project.

The *Digital Mementos* project was part of a wider enquiry by Daniela Petrelli (an Information Scientist at the University of Sheffield) into personal memories and how digital devices and information systems can support recollection and remembering. *Digital Mementos* explored the idea of artefacts used for remembering personal memories. Accepting that there are numerous physical objects we use in this respect but also considering that, with an increasing amount of our lives conducted digitally (via email, websites, digital photographs and video etc.), there may be an opportunity for 'digital

mementos' – digital artefacts for remembering, whether as software, digital devices or connected systems of both. I applied my critical artefact methods to explore the design of such 'digital mementos' with groups of stakeholders.

I was responsible for devising, organising and conducting the engagement activities and Petrelli participated in these workshops as an observer with access to any data generated as research material. Hence Petrelli gained further insights in her research area in the form of the conceptual designs produced and I had another opportunity to gain experience implementing critical artefact methods to inform the development of a critical artefact methodology.

5.5.1 Project process

The use of critical artefact methods in *Digital Mementos* was similar to that in the preliminary project work and *Living Rooms* project. Groups of stakeholders participated in a series of three workshops over four months centred on the discussion of conceptual designs or artefacts. In the first workshop these were the participant's own artefacts, having been told:

> *'Imagine you are creating a time-capsule to be opened in 20 years' time. For a recent memorable event, choose two objects to go into the time-capsule and bring them along to the workshop (or pictures of them if they are too valuable or difficult to move)."*

The second and third workshop conceptual designs were developed in response to the preceding discussions, with me as their sole designer. Each workshop lasted for around one hour and was video recorded.

The application also took account of the implications suggested by the *Living Rooms* project.

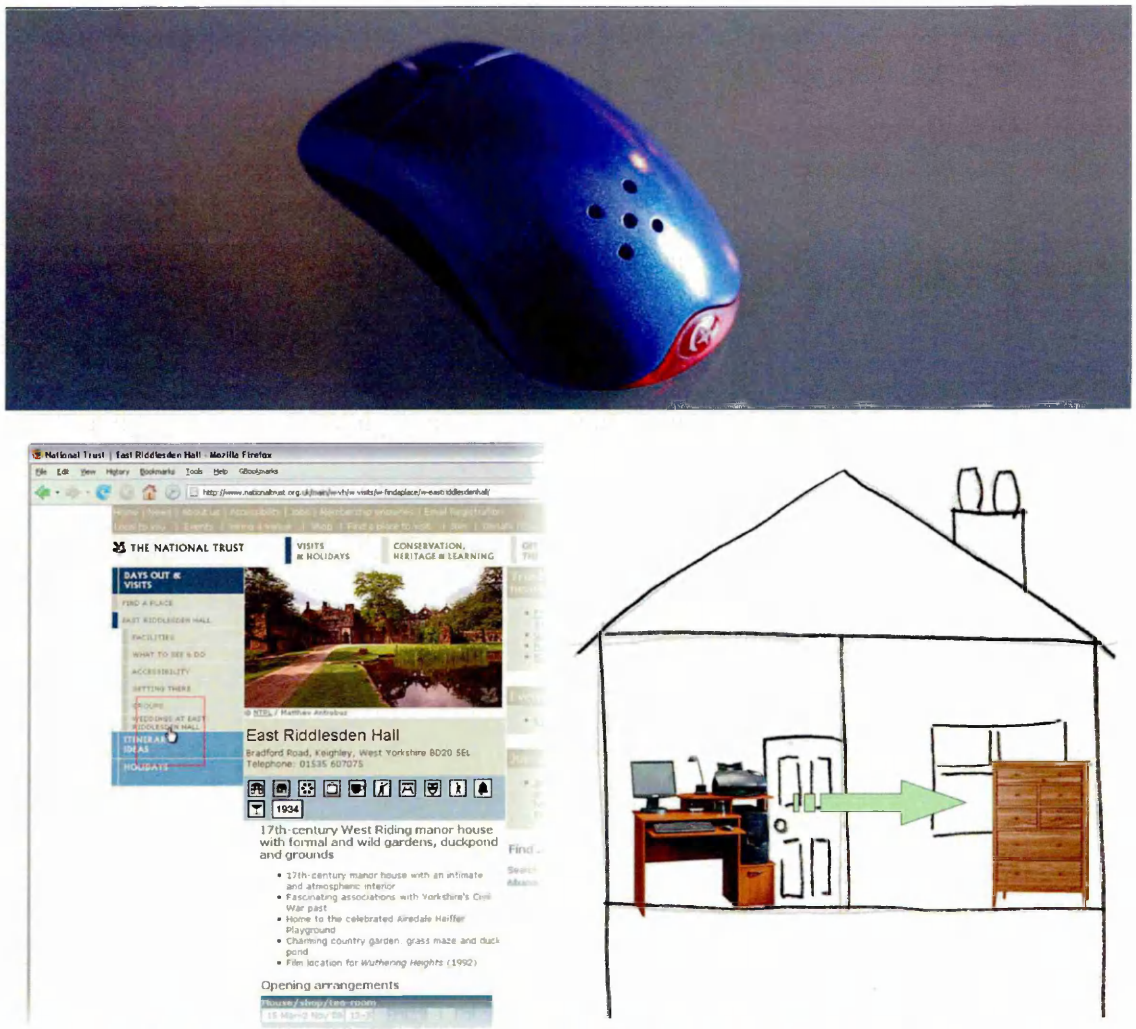

Figure 5.5 images from the *Aroma-mouse* presentation
When web page links are clicked, 100 pixel square screen grabs are sent wirelessly from PC to Aroma-mouse. Aroma-mouse acts as a 'drawer freshener', giving off a pleasant fragrance. Once discovered, clicking on Aroma-mouse buttons cycles through stored 'mouse-eye views' on the screen.

Firstly I generated the conceptual designs alone. This meant that I could utilise my developing understanding of what makes critical artefacts 'critical' and the most effective manner of presenting them. Specifically I attended to the novelty of the practices and products suggested by the conceptual designs. For example *Aroma-mouse* (Figure 5.5) suggests a drawer freshening device that, if discovered buried amongst your socks, can remind you of websites previously visited.

I also ensured that the scenarios used to present the critical artefacts were specific with believable rich characters. I did this by describing scenarios relating to my own personal life, specifically associating the critical artefacts' use with previous or imagined memorable events in my relationship with my wife – first date, wedding, honeymoon, first child. For example *Txt Globe* (Figure 5.6) is a device for storing and displaying memorable text messages. I described 'happening upon' the device as it displays a text message originally sent by a friend on the morning after my first date with my now wife.

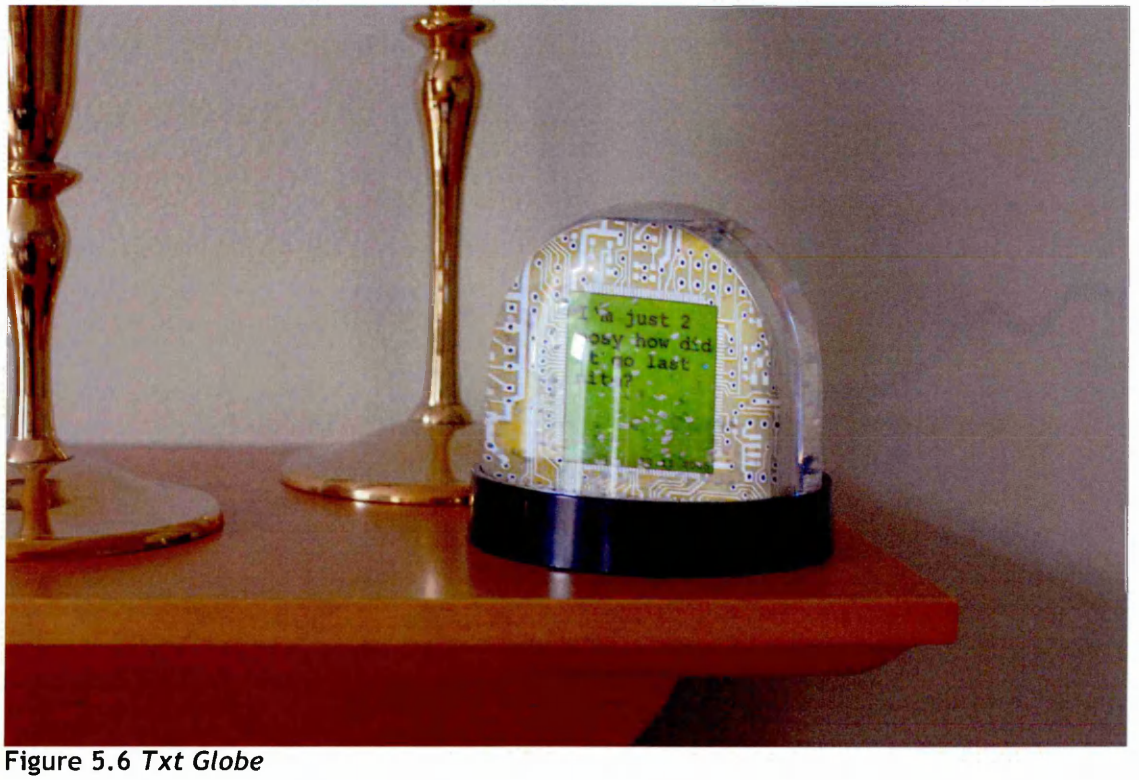

Figure 5.6 *Txt Globe*

I was careful to present the critical artefact conceptual designs not as practical proposals but something to 'get us talking'. When stakeholders questioned whether the concepts were 'tongue in cheek' (as one participant

termed it) I admitted to their provocative-ness and asked them to explore *why* the concepts were so.

Secondly activities were devised to educate stakeholders in specific knowledge about the context and to exercise their open-minded style of thinking (giving permission to think 'anything's possible'). This took the form of a short PowerPoint presentation at the beginning of the second workshop, before the first critical artefacts were presented. In two parts, this: illustrated market trends (e.g. home wireless media sharing); and reminded stakeholders that once 'other-worldly' ideas are now part of everyday life (e.g. the similarities between a Star Trek communicator from the 1960s television programme and a contemporary mobile phone).

Crucially an attempt was made to select suitable stakeholders to participate in the project. Specifically two groups of four to six stakeholders in Yorkshire participated in the project. A 'filtered' group was recruited according to their 'lead-user-ness' and an 'unfiltered' group was drawn randomly from Petrelli's existing group of research subjects. The selection process is detailed further below.

Finally in an attempt to create informal, relaxed environments for the workshops, they were held in Petrelli's and my own homes in the evenings. We hoped that such comfortable, domestic settings and 'after work' hours would give the workshops more of a 'social' feel.

5.5.2 Recruiting stakeholders with 'lead-user-ness'

In recruiting the filtered stakeholder group, I appropriated ideas from von Hippel's notion of lead users. Lead users face needs ahead of their peers and are in a position to benefit by innovating to satisfy those needs. *Digital Mementos* explored the design of products for recalling memories that could be triggered by digital artefacts (where a digital artefact could be many things – emails, text messages, photographs, audio and video). So those who are likely to experience 'future needs' in this context could be people in the process of creating significant personal memories that they will want to document for the future, and people who already create numerous digital artefacts in their personal lives. In the latter respect Petrelli and I did not specifically require people who are

good with technology and computers (although that did not rule them out). Rather people that use technology frequently because they are trying to satisfy a need, not because they are technically inclined. This distinction relates to the lead user motivation characteristic – according to von Hippel, lead users innovate to benefit, not because they (necessarily) like innovating[81].

Snowball sampling was used to select participants. To summarise, snowball sampling uses chains of acquaintances to provide participants for research – one participant will recommend acquaintances with similar characteristics as potential participants who can then refer other acquaintances, the final sample being selected from the resulting collection of 'potentials'. It is frequently used to obtain research participants from difficult to reach "hidden" populations where standard probability sampling methods are less effective (Heckathorn 1997), for example people reluctant to identify themselves as members of certain groups, such as illegal drug users. In *Digital Mementos* I used the sampling method as a simple way of obtaining participants with particular characteristics whilst maintaining a certain objective distance from them. If my own direct acquaintances had participated in the activities, their existing relationships with me could have coloured their engagement.

Firstly I identified acquaintances that could act as 'recruiters' and asked them to recommend their own acquaintances as potential participants based on certain criteria. I briefed the recruiters that I required people satisfying two or more of three criteria. The first two criteria were the needs outlined above (creators of numerous digital artefacts and being in a life stage with significant personal memories) and the third criterion was being open-minded and imaginative people.

These criteria were elaborated with examples such as people who use web cams to communicate with friends and family overseas (rather than because they like them as 'gadgets'), and families with young children whose lives they wish to document. Suitable imaginative and open-minded potential participants were described as "People who are open to new ideas, more likely question and

[81] Von Hippel (and most of his contemporaries) writes about lead users from his perspective as an economist. It is therefore unsurprising that his discussion tends to centre on (economic) benefits. I have found nothing in this literature that relates lead users' tendency to innovate to their aptitude for innovation.

develop their own ways of living rather than conforming to 'traditional' expectations". Again, examples were given in the form of 'clues' which could indicate such attitudes such as home décor – people who have chosen seating for their living room based on their specific needs (e.g. a comfy old sofa and a rocking chair to nurse the children in) rather than a traditional matching three piece suite; and holidays – people who 'build their own' (finding own hotels, flights, itineraries etc.) rather than booking package holidays.

These criteria were given to recruiters as a reference document (Appendix A) with a verbal briefing and clarification of their role. Five recruiters were used who recommended 13 potential participants. Six potentials were ruled out due to practical reasons – lack of free time or the difficulty of attending workshops in West Yorkshire. I then conducted short telephone interviews with the remaining seven potentials to check they satisfied the criteria.

I discussed above how the stakeholders more likely to engage usefully in the engagement activities could be described as imaginative people and people in tune with the possibilities of novel situations. The third of my 'suitable participants' criteria deals with the first of these two aspects and the characteristics of lead users appeared to offer a way of identifying the second. Relating the criteria to lead user characteristics, the first two point to the capability characteristic (facing needs ahead of their peers) with the motivation characteristic (potential to benefit from innovation) being inferred by answers to the questions in the potentials' telephone interviews. These interviews were informal and based around the following questions:

1) Consider a digital product that you have bought for your home recently.
    a) Before you bought it, what did you hope to use it for?
    b) Have you used the product the way you'd hoped or in a different way?
    c) What additional features do you think it needs?
2) What sorts of things you are doing now will you want to remember in future?
3) What do you think you do differently to most people?

During this process I used an informal 'rating' matrix to reflect on potential participants' suitability. I 'rated' the degree to which each potential matched each criteria on a simple scale of zero for no match, one for a

moderate match and two for a strong match. Discussions with two of the recruiters also enabled me to derive their own 'ratings' of each of their potential participants. Finally I gave an overall rating for the potentials based on my instinctive feeling of their suitability – my 'gut reaction' to them. The twin rating schemes appeared to validate each other – potentials with high ratings in the individual criteria tended to have a high 'gut reaction' rating.

Following the telephone interviews I used these ratings to support a final ordering of potentials' suitability via a 'traffic light' system: green for highly suitable, amber for moderately suitable and red for unsuitable. This ordering reflected an averaging of the ratings but was also weighted by my 'gut reaction' and notes about each participant. Of the seven potentials interviewed, I felt three were green and four were amber. One green potential was unavailable to participate, leaving two greens and four ambers as participants in the filtered group. This gave a group who were moderately to highly suitable participants according to the criteria I had defined.

To call stakeholders who have been selected in this way lead users is problematic. The precedent in studies of lead users, particularly within management science, is to use large sample sizes, detailed questioning and statistical analysis of responses to identify lead users (for example Franke, von Hippel & Schreier 2006). The small scale qualitative approach used here is not comparable with such in-depth quantitative studies. It is more appropriate to say that the idea of lead users has suggested a framework that was used to select suitable participants. These participants are identified by their resemblance to lead user characteristics in respect of the context. Hence stakeholders selected in this way have some 'lead user-*ness*' about them, without being specifically labelled *as* lead users.

5.6 Evaluating the implications from *Living Rooms*

As noted above, the workshops from *Living Rooms* and *Digital Mementos* were video recorded. I transcribed these recording as a way of re-visiting and reflecting on my experiences of participating in the discussions (see 2.3.3, p49).

My reflection on *Living Rooms* suggested factors that could be affecting stakeholders' effective engagement with the critical artefacts. This then had

implications for future implementations of critical artefact methods that I took account of in conducting *Digital Mementos*. By doing so, I aimed to produce an example of critical artefact methods working more effectively. If these implications led to an improvement in efficacy, my experiences in *Digital Mementos* would provide a useful set of 'data' from which to explore the facets of a critical artefact methodology and generalisable practical methods resulting from it.

So, did the *Living Rooms* implications improve the efficacy of the critical artefact methods as used in *Digital Mementos*? The manner in which I attended to these implications raises two specific questions in this respect:

Firstly within *Digital Mementos* there were two stakeholder groups – a group I filtered to be 'suitable participants' and an unfiltered group. Did the filtered group engage more effectively than the unfiltered group? I.e. was my characterisation of suitable participants effective – did my 'suitable participants' prove to be so?

Secondly as I dealt with all the other implications in *Digital Mementos* (relating to conceptual designs, stakeholder education and exercises, and workshop environment), was the stakeholder engagement more effective than in *Living Rooms* as a result? Specifically I accounted for all the *Living Rooms* implications in the *Digital Mementos* filtered group activities, the unfiltered group not taking into account the 'suitable participants' factor. So, how did my experiences with the *Digital Mementos* filtered group compare with the *Living Rooms* groups?

5.6.1 Selecting suitable participants

Two stakeholder groups participated in the project - a group filtered according to my characterisation of 'suitable participants', and a group not filtered according to any specific criteria. My experiences working with the two groups, as a designer, were different. I felt that the filtered group, the 'suitable participants' group, supported the development of my understanding of the context more effectively than the unfiltered group. The filtered group were more open-minded in their reception and subsequent engagement with the critical artefacts; their discussions appeared more insightful. In contrast the

unfiltered group were more dismissive of the critical artefacts and less likely to engage with them in an imaginative manner.

However these are personal judgements and may reflect the different relationships I developed with the two groups. For example snowball sampling meant the filtered groups' average age was close to my own (friends of friends in my age group) and could have led to a greater rapport with them. As such my observations alone are not sufficiently reliable and I must use another strategy to check their validity. So to triangulate these observations I have performed a superficial analysis of the two groups' engagement and their consequent contributions to my understanding. Whilst not a thorough documentation and description of the engagement activities, the results of this 'light touch' analysis does correlate with my own reflections.

To carry out this analysis I identified ten categories of engagement that could be seen in the video recordings. These were then grouped into negative, neutral and positive forms of engagement – in the sense that they were destructive or constructive of an exploratory, open-minded atmosphere in the discussions, or had little effect on such an atmosphere. The categories being:

Negative:

- Dismissive – dismissive of the conceptual design with little or no desire to discuss further or explore the possibilities suggested;
- Superficial/oblique – focussing on resolution of the artefact rather than its wider role and effect on experience; 'missing the point'.

Neutral:

- Off-topic – conversations not related to the artefact or scenario presented;
- Concept clarifications – questions to clarify the participants' understanding of a conceptual design, for example "so, it saves automatically?".

Positive:

- Conceptual/experiential – engaging with the artefact presented, envisaging what it would be like to experience the scenario;
- Constructive – working out how to make the artefact work, practically and technically;

- Self-critical – using the conceptual design to re-evaluate themselves and question their own practices;
- Affective – being emotionally affected by the conceptual design, for example finding the artefact 'magical';
- Imaginative – moving the conceptual design on, making developments and changes to it;
- Related topic – conversations related to the conceptual design presented but not explicitly envisaging what it would be like to experience it, for example anecdotes relating to similar experiences.

I reviewed the recordings of the second workshop (where the critical artefacts were presented) and tallied where the discussions appeared to fit each category using a simple 'rating' of one for a moderate match and two for a strong match. In this way I have produced a table of engagement categories for each group and each concept (Appendix B). The totals for each engagement category for each group then give an impression of how they engaged in the activities. However the unfiltered group were more likely to indulge in unfocussed or 'rambling' conversations than the filtered group, which tended to make their discussions longer and so they might have disproportionally high tallies due to the greater time in which to engage. Hence to compare the totals in a more equitable manner, the tallies have been divided by the total time for each group's discussions to give 'engagements per minute' values. These normalised values are presented in Figure 5.7.

The graph shows that both groups tended to engage mostly in the conceptual/experiential sense, but that the filtered group did so twice as often as the unfiltered group. Further, the filtered group's positive engagement tallies were in all but one occasion higher than the unfiltered group, and the unfiltered group's dismissive engagement tally was double that of the filtered group.

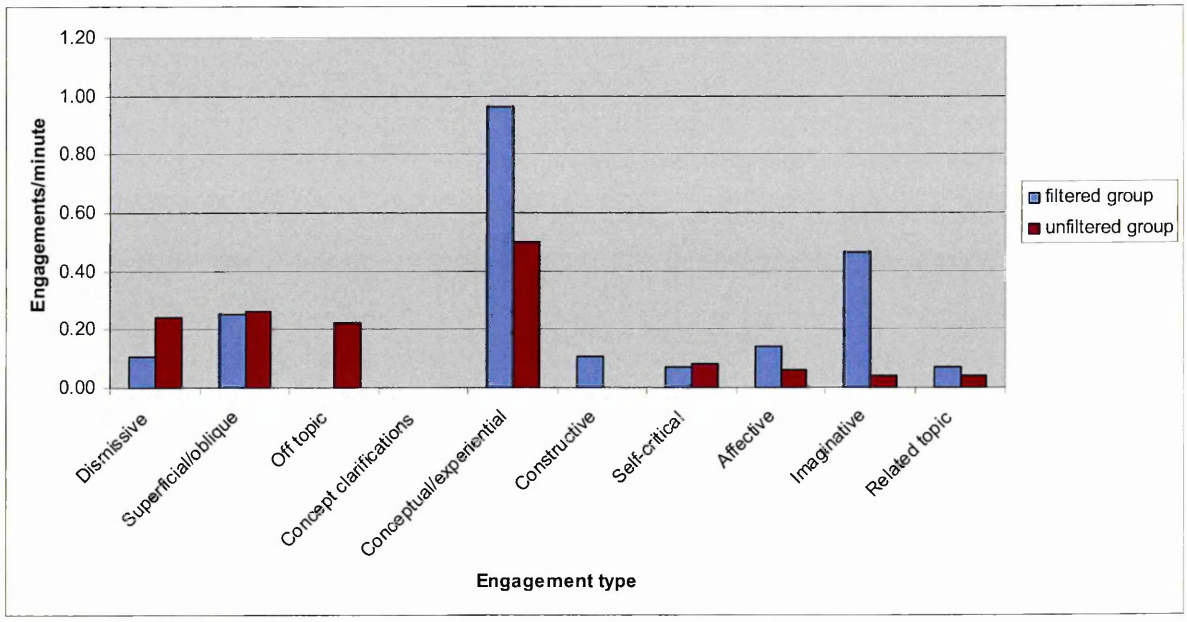

Figure 5.7 normalised tally of *Digital Mementos* engagement types

Although this informal analysis cannot be said to present a precise record of the engagement activities, it does re-enforce my experiences of working with both groups: that the filtered group's engagement with the critical artefacts informed my understanding of the context (proposed designs for 'digital mementos') more effectively. More particularly both groups engaged with the critical artefacts in the manner that my method required, but the filtered group did so more often and with fewer instances of 'negative engagement'. The 'suitable participants' group was most productive.

My experiences in *Digital Mementos* show that, in order for the engagement activities to operate most effectively, stakeholders should be selected according to their resemblance to 'suitable participants'. And that 'lead-user-ness' and an imaginative, open-minded attitude can characterise this suitability.

5.6.2 *Digital mementos* effectiveness

Within *Digital Mementos* the 'suitable participants' group engaged more effectively with the critical artefacts than the unfiltered group. My experiences also suggested that this group's engagement with critical artefacts was, overall, more effective than that I had experienced with the *Living Rooms* groups. As the designer participating in the workshop discussions, I had to work less at getting stakeholders to engage with the critical artefacts in a manner that usefully

informed my understanding. In general the conceptual designs were sufficient to prompt useful discussion.

Again to triangulate my experiences I have performed a 'light touch' analysis of the *Living Rooms* groups' engagements and their consequent contributions to my understanding. I have used the above ten engagement categories again to tally engagement types for each of the *Living Rooms* second workshops (where the critical artefacts were presented)[82]. These tallies have also been normalised to produce engagements per minute figures for each stakeholder group (also in Appendix B).

The *Digital Mementos* filtered/'suitable participants' workshops attended to all the implications suggested by the *Living Rooms* project. So, how do the *Digital Mementos* filtered group and the *Living Rooms* groups compare? Using the 'light touch' analyses of both, I have plotted the engagements/minute of the *Digital Mementos* filtered group and the average engagements/minute of the *Living Rooms* groups, see Figure 5.8.

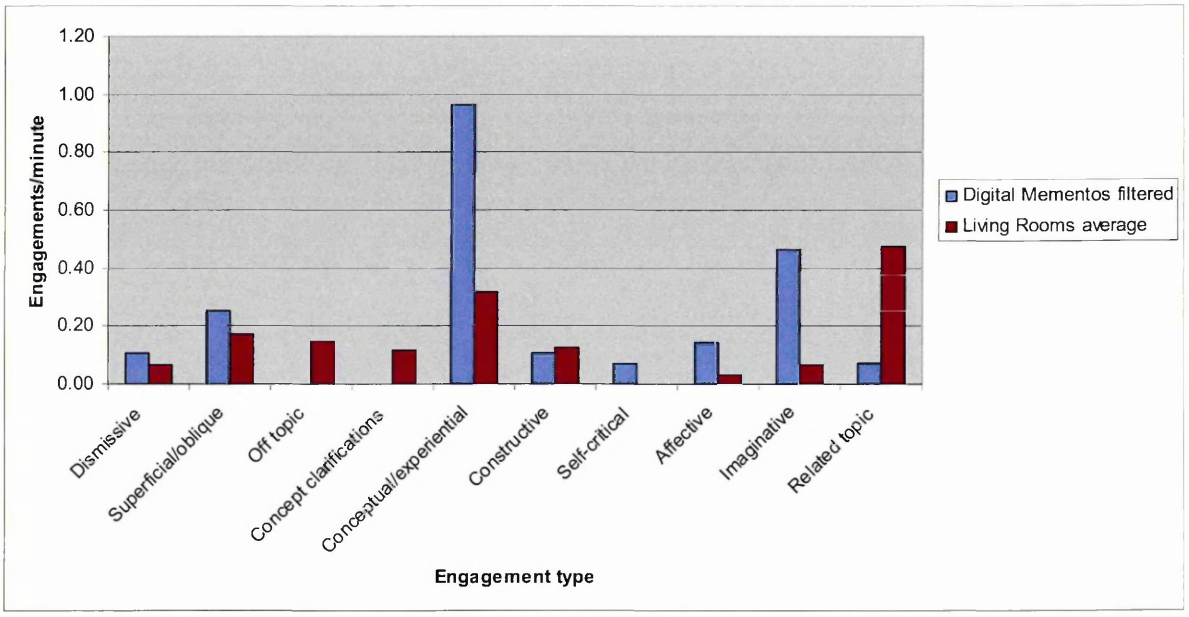

Figure 5.8 comparison between *Digital Mementos* and *Living Rooms* engagement types

The graph shows that the *Digital Mementos* group tended to engage in positive forms of engagement more often than the *Living Rooms* groups – having higher tallies in four of the six positive engagement types. And although

[82] This was only possible for three of the four stakeholder groups due to a defective audio track on the carers' group recording.

both tended to engage in probably the most desirable form of engagement (the conceptual/experiential sense), the *Digital Mementos* group did so more frequently – triple the tally of *Living Rooms* groups. The *Living Rooms* groups tended to engage in related topic conversations more often than the *Digital Mementos* group, but this is probably the least useful form of positive engagement.

This comparison supports my experiences. The engagement with the critical artefacts was more effective in the *Digital Mementos* filtered group than the *Living Rooms* groups. So, attending to the implications raised by *Living Rooms* did increase the effectiveness of *Digital Mementos*.

A by-product of the 'light touch' analysis of *Living Rooms*, was some validation of my feelings about factors relating to the conceptual designs; in particular another graph plotting the average engagement tallies for each design concept is illuminating, see Figure 5.9.

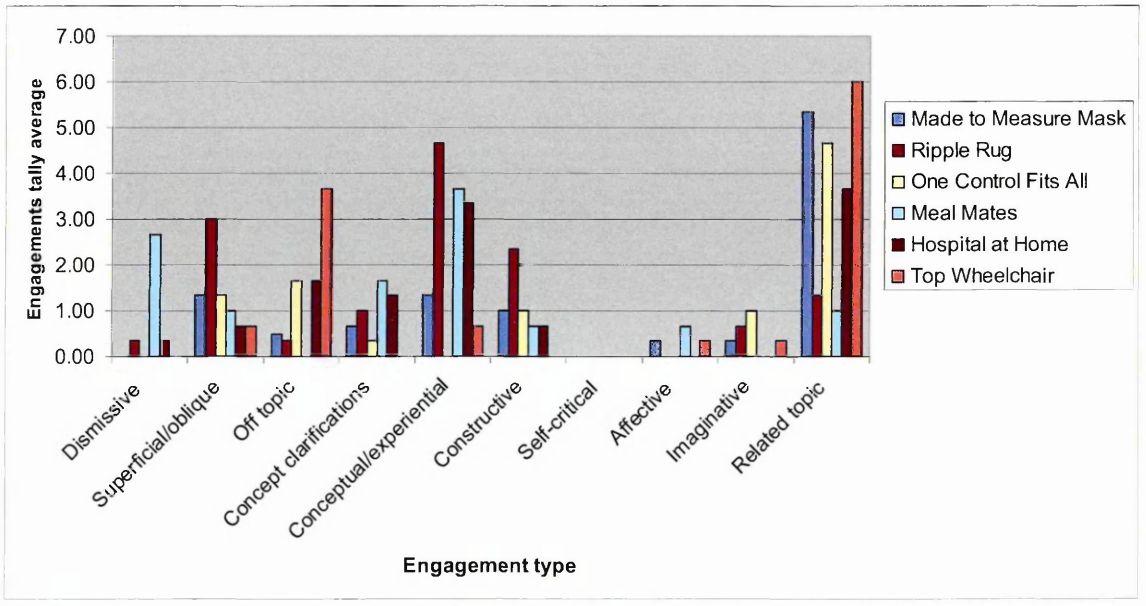

Figure 5.9 engagement tallies by *Living Rooms* conceptual designs

Stakeholders engaged least in the conceptual/experiential sense with the three conceptual designs with little or no specific narratives in their presentation (*Made to Measure Mask*, *One Control Fits All* and *Top Wheelchair*) and most with the three conceptual designs with some narrative in their presentation and/or suggestive of novel products and practices (*Ripple Rug*, *Meal Mates* and *Hospital at Home*).

5.7 Conclusion

This chapter described two projects where critical artefact methods were applied – *Living Rooms* and *Digital Mementos.*

Living Rooms suggested implications for ensuring the critical artefact engagement activities were effective. The more effective stakeholder engagement in *Digital Mementos* validated these implications, although this was not the main aim of the project. Rather it was to provide evidence of critical artefact methods working effectively – empirical data from which the specifics of the method's implementation and a critical artefact methodology's operation could be deduced. *Living Rooms* was effectively a large-scale pilot study for *Digital Mementos.*

As a result of *Living Rooms*, *Digital Mementos* provides useful 'data' from which to develop generalisable practical critical artefact methods. These 'data', my reflections upon it via mapping and modelling, and the critical artefact methodology defined as a result are described in the next chapter.

6 A critical artefact methodology

6.1 Introduction

I described in chapter 1 how my use of critical artefacts (as I refer to them) provided a breakthrough in the preliminary work. Presenting critical artefacts to stakeholders enabled them to engage with novel product ideas (and the practices they afforded) and the resulting discussions furthered my development of innovative, human-centred product ideas. This work suggested that 'critical artefact methods' based on this principle might be useful more generally and demonstrated their effectiveness in one particular context. The preliminary work allowed me to propose some basic features of a 'critical artefact methodology' to support these methods, but to define it further I needed to gather more comprehensive evidence of critical artefact methods in action and explore the features that they shared with existing approaches and theory.

In chapter 5 I described how I gathered this empirical evidence, and in particular how I identified and attended to the factors that ensured that the critical artefact methods 'worked'. In chapter 3 I explored how a critical artefact methodology relates to existing approaches that use stakeholder participation and existing approaches where artefacts are used as vehicles for stakeholder engagement. In chapter 4 I discussed how a critical artefact methodology, and other 'critical design practices', relate to the notions of enlightenment and emancipation advocated by Critical Theory.

My discussion in chapters 3 and 4 focussed on characterising existing approaches and theory and identifying which practical features and theoretical foundations a critical artefact methodology might share with them. In the first part of this chapter I will discuss how making a map of the development of the *Digital Mementos* conceptual designs clarified my experiences of critical artefact methods in operation. I then discuss how these experiences are re-enforced by

the characteristics of existing approaches and theory I had suggested were relevant in chapters 3 and 4.

In the second part of this chapter, following on from my experiences of critical artefact methods in operation, I will develop models of a critical artefact methodology and the principle of innovation using critiques that is central to it. This section will also summarise my proposed critical artefact methodology and, using illustrative examples from *Digital Mementos*, suggest how it might be used in practice.

The final part of this chapter deals with the question that if I have defined a critical artefact methodology, and the critical artefacts methods resulting from it appear to work, is it of practical use to designers? – Are the critical artefact methods comprehensible and amenable to designers and can they recognise the value of the results provided? Work I undertook to answer these questions is described and the results reported.

6.2 Defining a critical artefact methodology

6.2.1 *Digital Mementos* data

As discussed in chapter 5, I developed and tested effective critical artefact methods culminating in their application in the *Digital Mementos* project.

The aim of *Digital Mementos*, as a design project, was to develop innovative, human-centred product ideas for what 'digital mementos' might be. This might suggest that the results of the design project are the conceptual designs that I presented to stakeholders in the third and final discussion workshop; or rather the understanding I gained, as a designer, from participating in the discussion of these conceptual designs. In the *Living Rooms* project these conceptual designs and understanding were seen as the end points of the design project. In the preliminary work a second set of conceptual designs was seen as the end point as they were not presented in a workshop[83], and the understanding gained from discussing a second set of conceptual designs in the final workshops was seen as the end point of *Living Rooms*.

[83] In the preliminary work, I termed these conceptual designs 'way marker' concepts as they 'pointed the way' to the design of actual products.

However, I discussed in chapter 3 how a critical artefact methodology uses participation to *inform* design activity and, as such, the designer participates with the aim of producing 'better' design solutions (3.7, p74). I discussed how this suggests a more holistic process of participation informing design in which designing itself is the method of developing and expressing the designer's understanding of the context. Following this rationale then, the understanding I gained in the third workshop needed to be developed and expressed through a third, final round of designing.

So, to 'process' the 'raw' understanding I had from participating in the final discussion workshop, I devised a final set of proposals for the design of 'digital mementos'. These proposals then reflect the tacit understanding I have gained about stakeholder needs in this context and the potential for radical, innovative products to satisfy them[84]. I expressed these proposals in two ways: as 'opportunities for design' – themes and ideas which products could be devised in response to; and a final set of conceptual designs which express these themes. These themes and conceptual designs are effectively the main 'results' of the study and should therefore reflect my understanding at the end. If certain earlier conceptual designs expressed my understanding adequately at that later point, then I felt that it was appropriate to retain them. It was fruitless to develop new concepts where my later experiences re-enforced rather than changed my understanding. So, some of the output themes and conceptual designs bear strong resemblance to ones developed earlier in the project.

The final conceptual designs were illustrated via a PowerPoint presentation that is included on the Appendix C CD-ROM.

The empirical 'data' that I will use to define a critical artefact methodology is then the design proposals discussed above and my experiences, throughout *Digital Mementos*, of developing them.

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[84] I will discuss the tacit nature of this understanding and the role of designing in 'processing' it below in 6.2.4 (p171).

6.2.2 Making a map

To build a critical artefact methodology I need to identify similarities between critical artefact methods' operation and existing theory; I need to clarify my experiences of critical artefact methods' application in *Digital Mementos* so that I can relate them to relevant theory and practices[85].

To unpick my *Digital Mementos* experiences, I mapped how the results (final conceptual designs and 'opportunities for design') were related to my developing understanding, the conceptual designs I produced at each stage, and the stakeholders' engagement with the conceptual designs. My aim was to produce a diagram that illustrated *how* the results were produced based on my experiences of developing them – a diagram illustrating the progression of my thoughts (ideas and issues to be tackled concerning 'digital mementos') as developed and expressed in conceptual designs and as affected by the stakeholder engagement activities, over time. To recall these experiences I referred to my sketchbook notes and drawings made during the project, a project journal where I recorded key dates when my thinking progressed, and the video recordings and transcriptions of the discussion workshops (as discussed in 2.3, p45). This mapping/diagramming also meant that I could continue to operate via designerly means ('sketching out' how I experienced ideas 'flowing'), rather than having to make a split between being a designer or a researcher.

I began by determining the elements I would include in this 'flow diagram'. The three sets of conceptual designs I produced were obvious elements. Less straightforward to express as discrete elements (objects that could be 'diagrammed') were my thoughts, as a designer, about stakeholder needs and opportunities for design (my 'design understanding') and the stakeholders' engagement with the artefacts. To make discrete my 'design understanding' I recalled how various themes developed at each stage of the project, as prompted and evidenced by relevant entries in my sketchbook. To make discrete the stakeholders' engagement I reviewed the workshop recordings and transcripts, and summarised the main comments made in response to each

[85] This is equivalent to the 'reflect' step following the design practice as 'act' step of my research methodology as discussed in 2.2.2 (p37).

conceptual design with reference to them and my own recollections of the workshops.

In doing the latter I only referred to the comments of the stakeholder group I selected as being 'suitable participants' as this was the group where the critical artefact methods worked most effectively (this is discussed in 5.6, p152). This could be problematic as the conceptual designs' development was effectively influenced by both groups' workshop discussions. However as the mapping only follows how the designing was affected by the 'suitable participants' group's comments this may not be an issue – i.e. the map will be consistent within itself.

Once I had these discrete elements, I explored various ways of linking them that seemed to fit with my experiences of participating in the project – diagrams that showed how my understanding was affected by the stakeholders' comments and how the conceptual designs and themes developed and expressed this understanding. This was a difficult and frustrating process, where I devised, evaluated and discounted various possibilities using hand-drawn sketches and more complex, multi-layered diagrams using software such as PowerPoint and Adobe Photoshop.

But my struggles in producing a flow diagram were informative. Firstly they were a valuable use of designing as thinking – in this case 'sketching' maps of the *Digital Mementos* data helped me think about the operation of a critical artefact methodology. Secondly they made me re-frame the problem from "what diagram adequately maps the *Digital Mementos* data?" to "why do all diagrams inadequately express what I experienced happening in *Digital Mementos*?"

"The map is not the territory" Alfred Korzybski, 1931

This oft-cited quotation suggests some answers to my re-framed mapping problem. A map is not the territory it represents because it is always a *partial* representation of that territory – the territory is always richer (more detailed) than the map. A map is also an *abstraction* of the territory; it uses symbols to represent reality but something is lost in that abstraction – a symbol is not the object it represents. Finally a map is *subjective* – the territory features that the

maker chooses to map may not be the features the map's reader would recognise in the territory itself.

So, any diagram of critical artefact methods in operation (such as the development of the conceptual designs in *Digital Mementos*) will only *partially* describe the process – some elements will be missing. Any such map will also be an *abstraction* – it will use simplified 'symbols' for knowledge and activities that do not capture their complexity in reality. And finally any map that I produce will reflect my own interest in defining a critical artefact methodology.

As I have experienced it, in critical artefact methods the designer's understanding is developed in a complex and 'messy' way that resists straightforward mapping. However I can still clarify my experiences of this process and suggest how it operates by producing a diagrammatic map and discussing the nature of its limitations. With this in mind, I produced a flow diagram of the *Digital Mementos* data accepting that it was a limited representation of my experiences in the project. The result of this activity is effectively my clarified experiences rather than the diagram, which was my tool for producing it and therefore, as an illustration, is primarily intended for me. Hence the flow diagram is included in Appendix D rather than presented here.

Discussing the discrepancies between the flow diagram and my experiences enables me to suggest features of my critical artefact methods' operation. The following discussion should then allow me to identify parallels between my experiences in *Digital Mementos* and my discussion of existing practices and theory in chapters 3 and 4.

6.2.3 Clarifying my *Digital Mementos* experiences

The flow diagram I produced of the *Digital Mementos* data is included in Appendix D and shown in miniature in Figure 6.1.

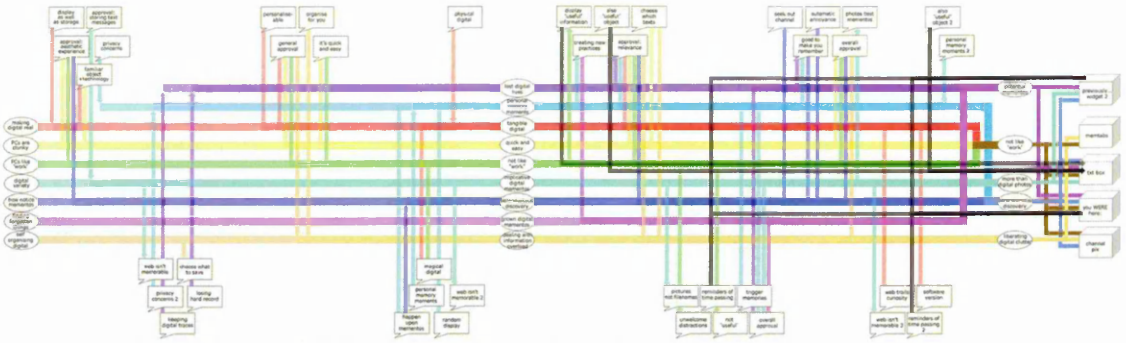

Figure 6.1 impression of the *Digital Mementos* flow diagram
(See **Appendix D** for full diagram.)

In this diagram I attempted to show how my understanding was developed and expressed through conceptual designs, and affected by the stakeholders' engagement with them. I showed my thinking about the design project (my 'design thinking') progressing from left to right with time – from my initial design thinking at the start, towards, at the end, my final design thinking in the form of 'opportunities for design' themes and final conceptual designs. In between these two points I illustrated my design thinking as coloured lines for each theme/idea whose density reflects their concreteness from vague 'hunches' to more confident understanding of the design context – i.e. the stronger the colour the more confident I was of the value of the theme/idea.

I produced the diagram in Adobe Photoshop and used layers to show how my design thinking developed: a layer showing which themes/ideas are developed in and expressed through which conceptual designs; and a layer showing how stakeholders' comments affected my design thinking.

Along the diagram, following each workshop, I restated the main themes/ideas in my design thinking. In some cases these themes/ideas had changed (such as from 'making digital real' to 'tangible digital') or were new (such as 'lost digital lives'). These were 'shorthand' summaries for themes and ideas I had developed in my notes and sketches and, as such, are post-hoc labels for my design thinking rather than explicit terms I used during the design project. A fuller description of these themes/ideas, with quotes from the workshop transcripts, is also provided in Appendix D.

As discussed above (6.2.2, p163) I felt the flow diagram was a limited representation of the progression of my design thinking in *Digital Mementos*, a simplified version of a more complex and subtle reality. I experienced this

complexity and subtlety in three respects: how (my) the designer's ideas and thinking are expressed in the conceptual designs; the affect of stakeholders' comments on the designer's ideas and thinking; and the linearity of the whole process.

To clarify my experiences and suggest how critical artefact methods operate, I will discuss two example diagrams. The first, Figure 6.2, illustrates how I did *not* experience the process as operating, and the second, Figure 6.3, is an illustration closer to my experiences.

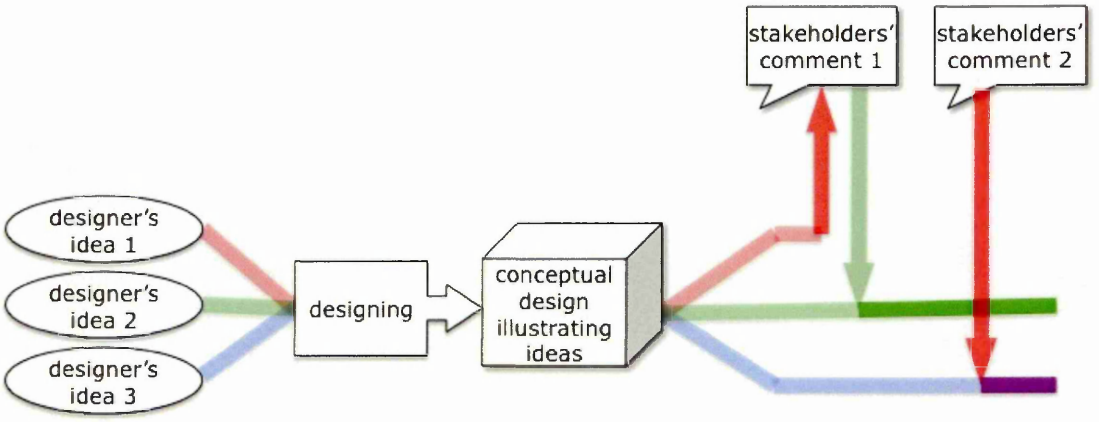

Figure 6.2 how the *Digital Mementos* design process did *not* work

As might be inferred from Figure 6.2, the conceptual designs were *not literal illustrations* of (my) the designer's ideas and thinking, the affect of stakeholders' comments on the conceptual designs were *not a simple logical combination* of the designer's and the stakeholders' ideas (one negating, supporting or changing the other), and the process was *not a linear series of distinct stages* – ideas, designing, discussion, new ideas.

Figure 6.3 is closer to how I experienced the process. There are two streams of understanding – the designer's thinking/ideas and the stakeholders' experiences and comprehension of their own needs. The crucial difference with Figure 6.2 is the role of designing as a way of 'processing' this understanding between the designer and stakeholders. This 'processing' is not an *explicit* process of identifying stakeholder needs and then revising concepts

to satisfy them. Rather the designer develops their *tacit* understanding of stakeholder needs via designing further concepts[86].

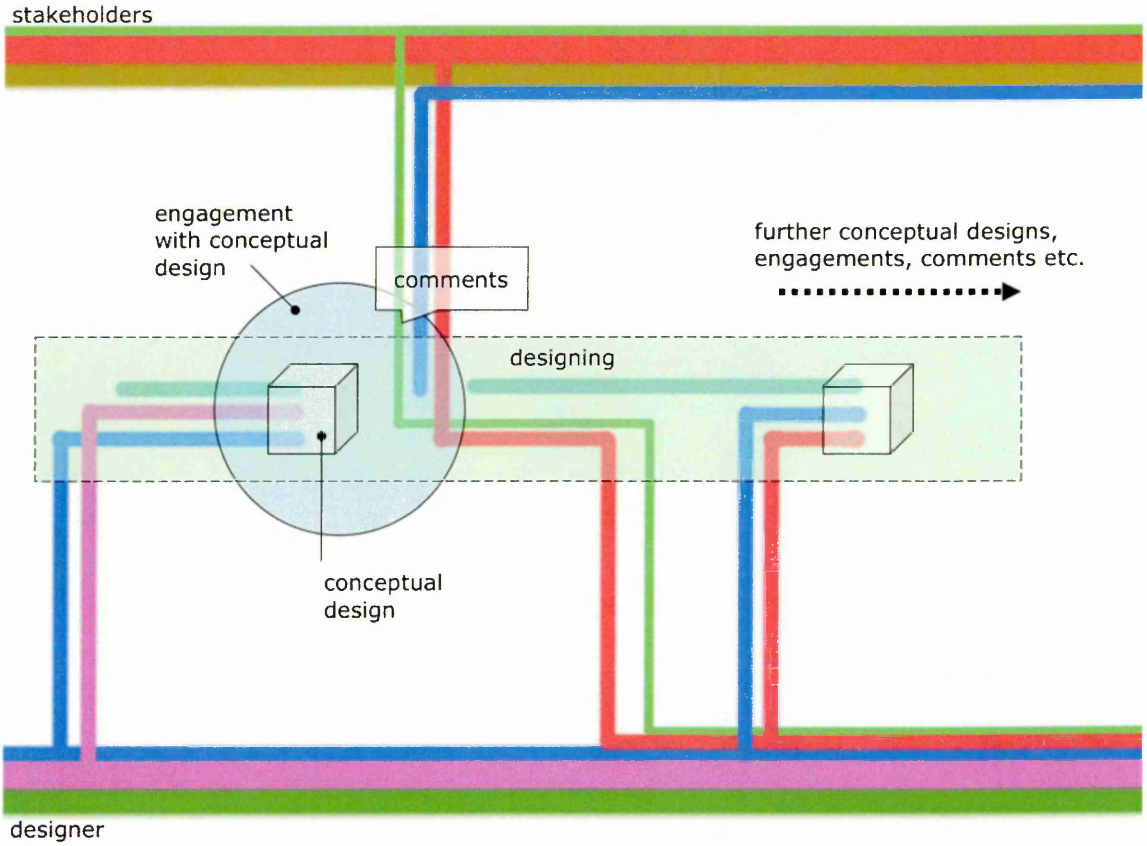

Figure 6.3 the *Digital Mementos* design process operated more like this

Throughout *Digital Mementos* I devised numerous design concepts as a way of developing my understanding of stakeholders' needs and the possibilities for innovative products to meet them. Many of these concepts remained in my sketchbook, but, by designing them, I developed a 'feel' for what ideas and themes had merit, which I then explored further in the conceptual designs I presented to the stakeholders.

In this respect, the conceptual designs are not literal illustrations of the designer's ideas. Rather they are, in the early stages of the process, possibilities for 'how things *could* be' that can be used to explore 'how things *should* be', and, increasingly as the process advances, expressions of the understanding gained as possibilities for 'how things *should* be'. The conceptual designs are both the tools of the enquiry and its output.

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[86] I will discuss tacit knowing in this respect further below (6.2.4, p171).

In *Digital Mementos*, the first set of conceptual designs suggested novel and provocative situations that challenged stakeholders' understanding of possible or acceptable products and practices – they were radical possibilities for 'how things *could* be'. I inferred from stakeholders' discussion of these conceptual designs which aspects of the suggested broader situations and practices they were most engaged by (the aspects of 'could be' likely to 'should be') and developed further conceptual designs focussed towards these aspects (from 'could be' to possible 'should be?'). The stakeholders' discussion of the second set of conceptual designs then allowed me to refine my understanding of stakeholders' needs which I developed and expressed in the final conceptual designs and 'opportunities for design' themes (my proposals for 'should be').

Returning to Figure 6.2, the diagram is flawed because it suggests that the designer has distinct ideas to test and that the stakeholders are able to verify, refute, or amend these ideas. However when attempting to produce radical innovative product ideas (the intention of critical artefact methods), the designer may have little understanding of the novel situations such products might afford and few if any ideas. Likewise the stakeholders may have insufficient experience to enable them to usefully evaluate any conceptual designs. So the conceptual designs produced in Figure 6.3 could be based on hunches, 'blue sky' ideas, provocative possibilities, or an understanding of stakeholder needs – their point being to suggest possibilities for stakeholders to engage with.

Also in Figure 6.2, the participants' comments have a direct *effect* on the designer's ideas. However in the process outlined in Figure 6.3, participants' comments have various ways of *affecting* the designer's understanding. In Figure 6.2, a negative comment ("I don't like X") leads to X being discounted; however in Figure 6.3 the same comment may not lead to the same end. X might be a deliberately provocative idea, or the designer might feel that X still has merit that the stakeholders have not appreciated. Positive and ambiguous comments may have similarly varied affects.

For example, in *Digital Mementos*, stakeholders commented that they did not see web sites as being valuable material for mementos. These comments did not stop me developing further conceptual designs using screen shots of web

pages and other software applications as mementos as I believed stakeholders were not appreciating the necessity of capturing such items as their everyday activities became increasingly computer-mediated (see also my notes about 'capturing potential mementos' in the *Digital Mementos* PowerPoint file on the Appendix C CD-ROM).

Returning to my flow diagram, I illustrated the affect of stakeholders' comments in several ways according to whether they strengthened my ideas/themes, weakened them, modified them or inspired new ideas/themes. I also illustrated these affects as being direct (where a comment explicitly related to an idea/theme) or indirect (where a comment did not relate explicitly to an idea/theme but provided an implicit insight in relation to it). This clarified that, in general, stakeholders *affected* the conceptual designs I produced rather than has a direct *effect* on them. Some design refinements suggested in the final workshop discussion did have some effect on the final conceptual designs that I developed as the project's outputs, which I illustrated as grey lines on a third layer of my flow diagram. However this was in the later stages of the process, when the artefacts were more 'prototypical' (see 3.6, p69).

Although superior to other versions I developed along the way, I am still unsatisfied with the *Digital Mementos* diagram I finally produced (Appendix D). The diagram is complex and difficult to read. The affects of stakeholder comments on my design thinking, although their variable operation is illustrated, do not 'add up'. This is because the 'map is not the territory'; the diagram is both an abstraction and a partial representation of my experiences. For instance, it is not only specific stakeholder comments that affected my design understanding. The development of my design understanding depended on the rapport I developed with the stakeholders, which included elements such as an appreciation of their temperament, the ambience of the workshops, non-verbal communication and their speech inflections. Also my design thinking was not a set of discrete themes/ideas as I illustrated it, rather a collection of dynamic, overlapping and (at times) partially-formed thoughts.

Any map will not give a realistic picture of the complex, rich process I suggest is happening in critical artefact methods. However in discussing the limitations of the map I did finally produce, I intended to clarify my

experiences of such methods in operation. I will discuss how these experiences relate to existing theories and practices as I discussed them earlier in chapters 3 and 4, but first I will offer some ideas to support the notion of designing as a way of 'processing' the stakeholders' engagement.

6.2.4 Designing as 'processing' and Polanyi's indwelling

In chapter 3 I discussed existing approaches that use stakeholder participation. Within this discussion I noted how some forms of participatory design (and co-design) use participation to *inform* design activity (rather than *as* design activity). My experiences in *Digital Mementos*, discussed above, confirmed my suggestion that a critical artefact methodology also uses participation to inform design activity – the stakeholders' comments affected the conceptual designs I produced, but this was a complex and subtle affect not a logical combination of their and my ideas as might be said of participation *as* design.

In my experiences, this affect also relied on my 'processing' of stakeholders' discussions via designing further artefacts. This view correlates with the view of knowledge creation embodied in the cultural probes approach as it was originally intended (see my discussion of Gaver et al. 2004 and Boehner et al. 2007 in 3.5.2, p64) – that any understanding is inescapably subjective and relies on designers and stakeholders interpreting each other's knowledge and experiences through their own. Artefacts, and the process of designing them, are central to these interpreting activities – they are the means by which the designer develops and expresses their understanding and the subjects of the stakeholders' engagement. The use of designing also parallels with the notion of designing as a way of 'thinking out loud' (see 3.7, p81). But it is Michael Polanyi's (1966) notion of "indwelling" that provides a useful description of designing as 'processing'.

Polanyi describes "tacit knowing" relating to the notion that "we can know more than we can tell" (ibid.) – that we have some practical and useful knowledge that we cannot articulate: tacit knowledge. He describes this process of knowing as consisting of a meaningful relationship between two terms, proximal and distal, the former we cannot articulate directly but rather always appreciate in terms of the latter. Polanyi discusses this relationship via several

examples, including experiments with electric shocks triggered by particular syllables, our physiological processes, and skilled practitioners' use of their tools.

For example, in a recorded experiment Polanyi refers to, subjects correctly anticipated electric shocks triggered by particular syllables without being able to identify the syllables themselves. The subjects were aware of the 'shock syllables' (the proximal part) but only in terms of the electric shocks (the distal part). Polanyi refers to the "functional structure" and "phenomenal structure" between the two terms of tacit knowing: that we attend from the proximal to the distal and that our awareness of the proximal term is only ever in terms of the appearance of the distal term. For example a carpenter is aware of his (proximal) hammer in terms of the (distal) nail, and is aware of the (proximal) muscular movements of hammering in terms of the nail's movement into the wood (distal).

Polanyi's discussion moves on to the ontological aspect of tacit knowing. He suggests that:

> *"Since tacit knowing establishes a meaningful relationship between two terms, we may identify it with the* understanding *of the comprehensive entity which these two terms jointly constitute. Thus the proximal term represents the* particulars *of this entity, and we can say, accordingly, that we comprehend the entity by relying on our awareness of its particulars for attending to their joint meaning." (ibid., p13 his* emphasis*)*

He gives the example of physiological bodily processes: we attend from our bodily processes to the qualities of external things, for example from the muscular movements and nerve signals of our eyes to what we're looking at. He also suggests that in this respect we can extend our bodies via the use of tools. In using a stick as a probe to explore an environment, we initially attend to the feeling of the stick in our hand, but we soon begin to appreciate these feelings in terms of the objects the stick is encountering. The feeling of the stick in hand becomes proximal, and its meaning is instead expressed via the distal (the objects it encounters). Polanyi suggests that in making such moves, we make something function in the same way we use our own bodies. When we use something to attend from it to something else, it then appears to us in

terms of the thing to which we are attending. Polanyi refers to our making something function as the proximal term in this way as "indwelling" (ibid.).

Polanyi's concept of indwelling then suggests how the relationships between the proximal and distal terms of tacit knowing can be used to understand the comprehensive entities constituted by such elements. In the case of my development of critical artefact methods, I suggest the comprehensive entity is the development of product ideas (as affected by the stakeholder engagement activities). So, I can 'process' my experiences of the stakeholder engagement activities by dwelling in them; by attending from these experiences (as the proximal term) to the designing of further conceptual designs (as the distal term), I can appreciate the stakeholders' engagement in terms of the conceptual designs that I produce.

6.2.5 Parallels between practical experiences and precedent

In chapter 3 I suggested that, in step-wise 'social science' type approaches, researchers participate in a social context in order to produce a descriptive account of that context that then informs designing for it. I suggested an alternative way for participation to inform design in a holistic, 'design-led' manner (see 3.7, p74). My *Digital Mementos* experiences fit with such 'design-led' approaches where the aim of the designers' participation is to produce 'better' designs rather than to describe the social context. Within such approaches, the designer develops their (implicit) understanding in an overlapping, holistic manner through both participation and design activity rather than a discrete stage of producing an explicit description. This fits with my *Digital Mementos* experiences: of the process as a continuing holistic activity rather than a linear series of distinct stages; of devising numerous conceptual designs as a way of developing and then expressing my understanding; and of the conceptual designs as not (necessarily) literal illustrations of my ideas (i.e. they could generate as well as test ideas).

In chapter 3 I also discussed existing approaches that use artefacts as a vehicle for engaging with stakeholders. In 3.6 (p69), I developed a framework for discussing the role of such artefacts referring to cultural probes and Ehn & Kyng's mock-ups as exemplars and other discussions of artefacts in the design

process (specifically the nature of 'prototypes'). In this framework, I noted how artefacts might be used where the intention of the activity varies from open exploration of possibilities towards closed testing of proposals, how the character of the artefacts might vary from provocative (of thought or action) to 'prototypical' (implying a design direction or destination), and how stakeholders' engagement with artefacts might vary between critical reflection, 'ready-to-hand' use and 'present-at-hand' evaluation. My plotting of cultural probes, mock-ups and 'prototypes' on these continua suggests that provocative artefacts lend themselves to open exploration of possibilities and critical reflection or ready-to-hand engagement, and that prototypical artefacts lend themselves to closed testing of proposals and present-at-hand engagement.

My experiences of the roles of conceptual designs in *Digital Mementos* fit this framework. There was a progression from provocative artefacts ('what could be'), where stakeholders critically reflected on the situations they suggested, towards more prototypical artefacts ('what should be'), where stakeholders evaluated their suitability to their needs. This framework also justifies my assertion that the *Digital Mementos* conceptual designs were not literal illustrations of my ideas rather they were provocative tools for exploring possibilities. This aspect of the conceptual designs also links with the notion of critiques that I discussed in chapter 4.

In chapter 4 I discussed a view of design informed by Critical Theory, including a review of critical design and other related approaches. In this view, the design and use of products propagates unrecognised assumptions about roles for those products and the wider social practices associated with them, which in turn oppresses the stakeholders[87] of those products. I discussed how the strategy of 'critical design practices' for dealing with this oppression was to enlighten the products' designers and/or stakeholders of these assumptions and thereby emancipate them, and that critiques were the tools for achieving this. In critical design, and some other critical design practices, artefacts are designed as critiques (such as being designed according to alternative values such as 'user-unfriendliness', or to embody alternative product possibilities and

[87] In the wider human-centred design sense of the term discussed in 1.7 (p26).

their associated roles and practices). I suggested there that the initial conceptual designs used in a critical artefact methodology (the critical artefacts and their associated use scenarios) operated as critiques. I also discussed in 4.5 (p121) that an implication of critiques (and, by extension, 'artefacts-as-critiques') is that their originators somehow 'know better' than those who are 'oppressed'. I suggested that a critical artefact methodology might be immune from such a criticism of elitism by developing further conceptual designs reflecting needs stakeholders' would recognise as relevant. My experiences in *Digital Mementos* appear to show this in action: I presented visions of 'what *could* be' and then suggested visions of 'what *should* be', the *should* being determined by my 'processing' of stakeholders' engagement into a tacit understanding of their needs.

This notion of critiques also supports the intention of a critical artefact methodology to generate radically innovative product ideas. In *Digital Mementos*, my understanding of stakeholders' needs was not derived solely in relation to their existing experiences, but also in relation to the broader view of possibilities the critiques afforded (the potential, novel experiences suggested by the provocative conceptual designs).

In chapter 4 I also discussed how the operation of critical design practices depends on the re-conceptualisation of theory espoused by Critical Theory – theory as both explaining and constituting the world. In this view, critiques afford change by encouraging their readers to theorise the world differently. The term *reader* is important here as it implies an intellectual engagement with the ideas and assumptions embodied ('written') in the critique. This view means that designers and stakeholders must engage with 'artefacts-as-critiques' (critical artefacts) as *co-readers* – a subjective engagement with the embodied values, assumptions and ideas (see also 4.3.1, p103). In my *Digital Mementos* experiences, this can be seen operating: the conceptual designs were not logical combinations of my ideas and the stakeholders' views, rather they were critiques and our reading of them fostered different thinking about the world – a broader view of what products and practices were possible and what stakeholder needs are relevant in these broader respects.

6.3 A critical artefact methodology

Through my discussion above, I have aimed to clarify the constituent elements of critical artefact methods according to my *Digital Mementos* experiences and, with reference to ideas from existing practice and theory, begun to suggest the elements of a critical artefact methodology. My task in this section is to produce a description of a critical artefact methodology that is compatible with the operation of the critical artefact methods I have devised – a methodology that provides a rationale for the methods, and supports their results. To do this, I will discuss a model of innovation using critiques that illustrates the central principle of my critical artefact methodology and a model of how this principle can be applied within a design process. Finally I will summarise my critical artefact methodology and suggest how it might be deployed.

6.3.1 A model of innovation using critiques

As discussed in chapter 3, a critical artefact methodology uses participation to inform design in a 'design-led' manner and such approaches can be illustrated as shown in Figure 6.4.

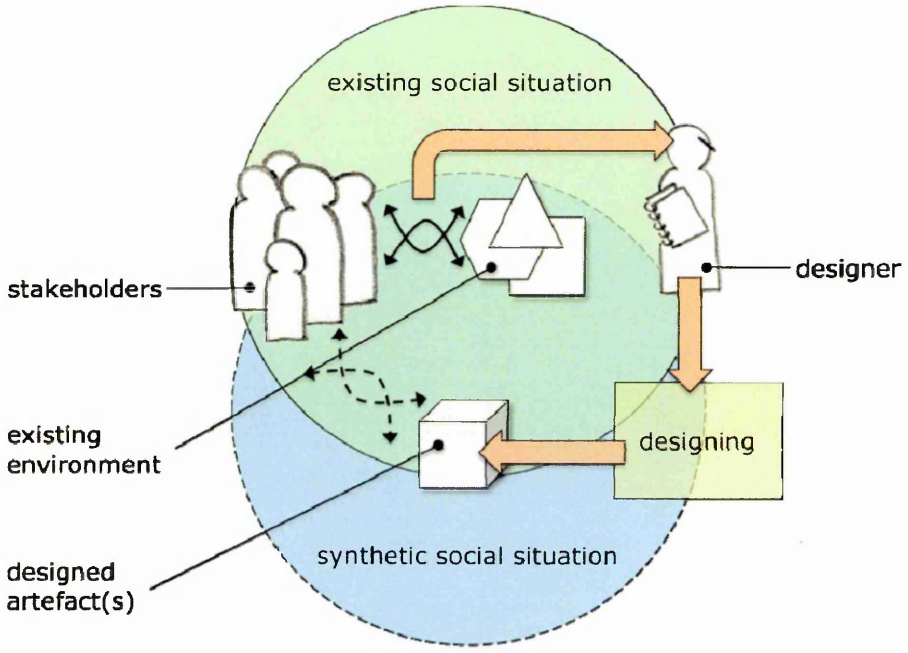

Figure 6.4 the 'design-led' approach of participation to inform design
The designed artefact(s) afford a synthetic social situation.

The upper circle relates to the existing social situation that forms the starting point for the design activity. This social situation consists of the stakeholders' performances in/with their environment (artefacts, systems, spaces, processes etc.). The designer participates in and observes this situation to inform their designing – they attend *from* their participation in and observation of stakeholders' performances *to* their design of new artefacts (to use Polanyi's terms, as discussed in 6.2.4, p171). The stakeholders' environment is altered by the introduction of the designed artefact(s), which then offers new potential performances. The lower circle then relates to the synthetic social situation, afforded by the altered environment and potential performances, which overlaps to a varying degree with the existing situation.

The social situations illustrated in Figure 6.4 could be said to be embodiments of the stakeholders' and designer's understanding of, for example: (their own and others') needs and wants/desires; technologies and how they might be employed and appropriated; 'acceptable' social practices; and how problems could be said to be 'solved'[88]. Stakeholders' performance in/with their environments create social situations that express what they

[88] My description of understanding here is compatible with accounts of the social construction of technology as summarised in 1.1.2 (p12).

comprehend to be possible (needs, technologies, practices etc.). Figure 6.5 illustrates the relationship between stakeholders' and designer's understandings, and social situations as embodiments of them.

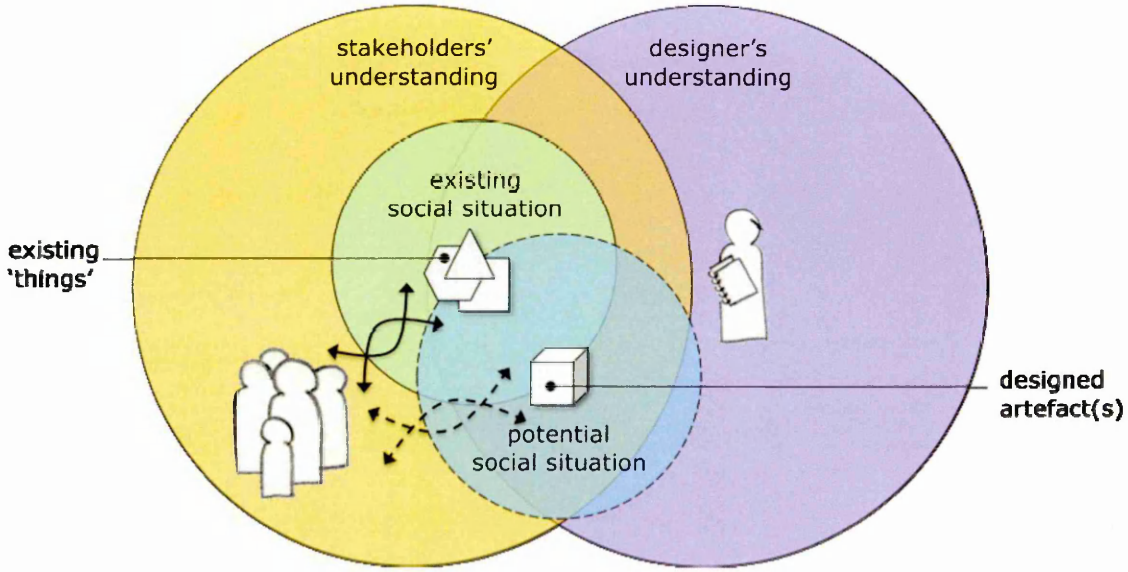

Figure 6.5 social situations and stakeholders' & designer's understandings:
1. designed artefact(s) channel designer's understanding;
2. designed artefact(s) afford a synthetic situation;
3. stakeholders' (and designer's) engagement with the synthetic situation expresses their understanding;
4. the understanding expressed in the engagement is a part of stakeholders' and designer's wider understanding.

Stakeholders' and designer's understandings (the outer circles) are likely to overlap. However there are some areas that fall outside their individual comprehension, for example the designer may not completely understand stakeholders' needs and stakeholders may not understand the potential of a particular technology (as the designer might). An existing social situation (the inner green circle) may then fit completely within the stakeholders' understanding as an embodiment of that understanding (via their performance with the existing environment). As previously illustrated in Figure 6.4, the designer's attention to that situation may then allow them to increase their (tacit) understanding of stakeholder's needs. The potential social situation afforded by any designed artefacts (the inner blue circle) is then an embodiment of the designer's understanding (of stakeholders' needs and technological solutions) that may be partially outside the stakeholders' understanding. However, any artefacts designed then afford synthetic social

situations that allow stakeholders and designers to explore alternative possibilities via their *engagement* with those situations, where engagement refers to people's performance (what they say and do) and reflective activity (reflection upon their performance and wider issues associated with the social situation).

Stakeholders' and designer's engagement with the synthetic situations enables them to determine which situations fit within their *combined* understanding, although these situations may be partially outside their *individual* understandings – i.e. determining a product that satisfies stakeholders' needs that are partially outside the designer's experiences and/or utilising technological and practical possibilities understood by the designer that stakeholders are unaware of. The designer expresses their understanding through the artefacts and appreciates the stakeholders' understanding through their performance with the artefacts – artefacts act as a 'channel' for the designer's ideas, and stakeholders' engagement with the consequent synthetic situations (and the designer) provides a 'return channel' for their ideas, opinions and needs.

Figure 6.5 suggests an approach for developing products that, between them, stakeholders' and designers recognise as being relevant to needs, wants/desires and possible ways of satisfying them. However, moving on, this approach is of limited use if the aim is to develop radical, innovative products that satisfy future or latent needs[89] outside stakeholders' and designer's current understanding – i.e. such products could express needs, wants/desires or possible ways of dealing with them that the stakeholders and designer do not recognise as possibilities. The strategy used by a critical artefact methodology to tackle this is the use of critiques.

As discussed in chapter 4 (and 6.2.5, p173), Critical Theory suggests that people's understanding of the world is limited by their unthinking acceptance of the factors that contextualise their understanding (e.g. historical precedent, culture, ideology). Or to rephrase this, Critical Theory suggests people have a restricted view of what is possible (how society operates and their place in it, in

[89] For more on latent needs see my discussion in 1.8 (p30).

the case of Critical Theory). I have discussed how Critical Theory strives to emancipate people by enlightening them of the 'oppressive power relationships'[90] their unthinking acceptance propagates, and how critiques facilitate this enlightenment and emancipation. I have also discussed how critical design practices, including a critical artefact methodology, use artefacts as critiques. So, such critical artefacts, in the manner of critiques, enable the exploration of wider possibilities for products and the social situations they afford. Figure 6.6 develops the ideas illustrated in Figure 6.5 to suggest how such a principle might operate.

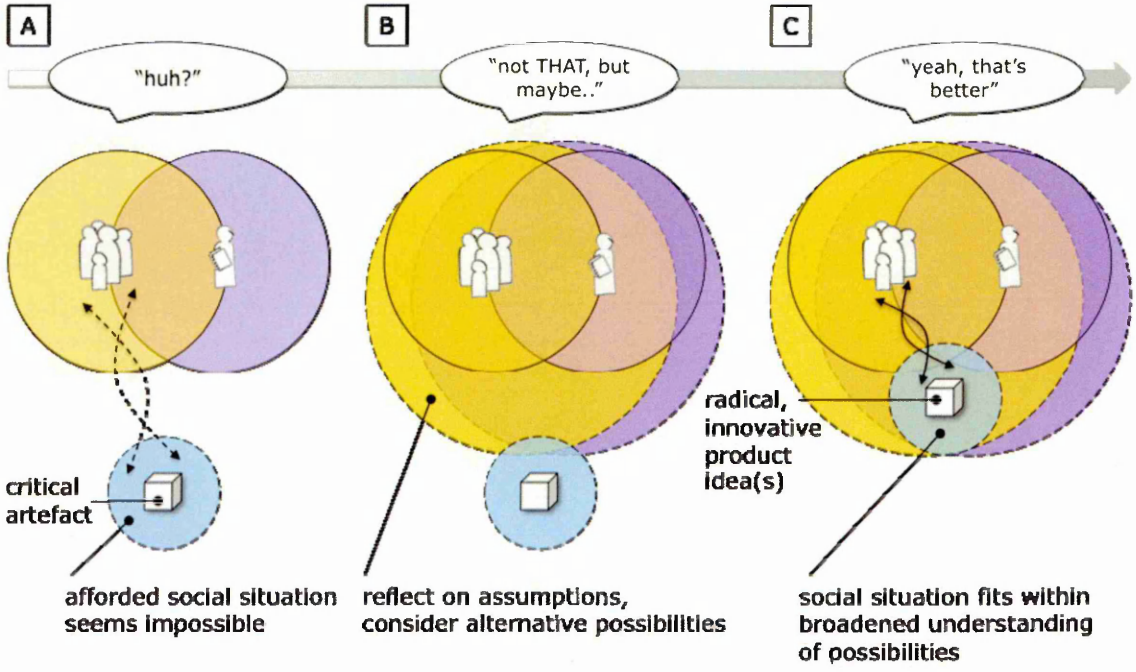

Figure 6.6 how critical artefacts can foster innovation:
A - a critical artefact is outside stakeholder's and designer's understanding, prior to their engagement with it;
B - designer's and stakeholder's engagement with a critical artefact broadens their understanding;
C - this broadened understanding creates a larger space for new product ideas

Figure 6.6 illustrates how artefacts might operate as critiques in three stages, over time. In this case, the synthetic social situations afforded by artefacts are of interest rather than the existing social situations, so these diagrams omit the inner green circle illustrating existing social situations. Firstly, the designer devises a critical artefact that is in some ways 'impossible'

[90] I noted in 4.4 that 'oppression' is a rather strong term in this respect, but, diluted, it gives a flavour of the situation to which it refers.

(for example it implies 'socially unacceptable' behaviour, as they understand it). This critical artefact then affords a social situation that is outside both stakeholders' and designer's understandings (diagram A) – the environment and performances appear impossible according to what they comprehend as possible (needs, technologies, practices etc.).

The critical artefact suggests an alternative possibility outside stakeholders' and designer's current understanding. Stakeholders' and designer's engagement with the critical artefact then provokes them to reflect on the limitations of their current understanding that consequently broadens their understanding (diagram B). I have discussed in 6.2.5 (p173, and chapter 4) how the operation of critiques depends on people engaging with them as readers; how 'reading' the alternative explanations offered in critiques encourages the reader to become aware of and overcome the limitations of their own explanations of the world (and, as such, change the world by theorising it differently – see 4.3.3, p106). So, stakeholders' and designer's engagement with critical artefacts can be seen as a co-reading of them as critiques. Through this reading, they reflect on alternative possibilities for needs, wants/desires, practices and products (and, arguably, the values and ideologies embedded in them) that in turn encourage them to recognise the limitations of and expand their understanding of possibilities in this respect.

The broadening of understanding shown in diagram B may not be to the extent of encompassing the alternative possibility suggested by the critical artefact, but crucially it enables stakeholders and designer to consider possibilities that they would not have done otherwise. So, when determining which (synthetic) social situations fit stakeholders' and designer's combined understanding (as discussed above in relation to Figure 6.5), the range of possibilities is broader. Any designed artefact that affords social situations in the extended range of possibilities is then likely to be radically innovative (diagram C) – it suggests environments and performances beyond what stakeholders and designer had previously understood as possible but now can comprehend.

Within my discussion of this model of innovation using critiques, the activity of designing itself has not featured greatly. Early on I noted how

designing was implicit in stakeholders' and designer's engagement with the situations afforded by artefacts. Relating to knowledge production as subjective interpretation by both designers and stakeholders (discussed in 3.7, p74), designers develop and express their understanding through designing artefacts and stakeholders reflect upon and express their understanding via their engagement with these artefacts (and afforded synthetic situations). Designers 'process' this engagement via designing further artefacts, an application of Polanyi's notion of indwelling as discussed in 6.2.4 (p171). So, designing is a way of developing and expressing understanding, artefacts can act as critiques to broaden this understanding and, via designing to 'process' this engagement, foster innovation.

This designing is also of a particular form – the production of 'artefacts-as-critiques'. As discussed in (4.4, p116), such critical design practices challenge rather than affirm assumptions about the roles and products of 'mainstream' design. This alternative mode of operating may be difficult for some designers. However there is evidence to suggest that designers can practice in this alternate manner: Paul Chamberlain, my co-designer in *Living Rooms*, devised critical artefacts and appreciated their usefulness (see 5.2.3, p130); as I will discuss in 6.4.1 (p202), professional designers who evaluated *Digital Mementos'* outcomes understood the role of the critical artefacts; in a research training workshop, using methods influenced by my research, a group of experienced architects were able to make and employ critical artefacts to explore novel frameworks for conducting client presentations[91]; and there are existing approaches, such as research by Gaver and by Dunne & Raby, that use artefacts to prompt reflection in a similar manner (see 3.6, p69).

6.3.2 A model of a critical artefact methodology

Having developed a model of innovation using critiques above, I will now suggest how it fits into a design process for developing innovative product

[91] I ran this session within a three day workshop delivered with colleagues Prof. Chris Rust and Dr. Nicola Wood in April 2008 as part of Sint-Lucas Architecture School's *Research Training Sessions* in Brussels.

ideas. A model of such a design process is, in essence, my critical artefact methodology as I have developed it.

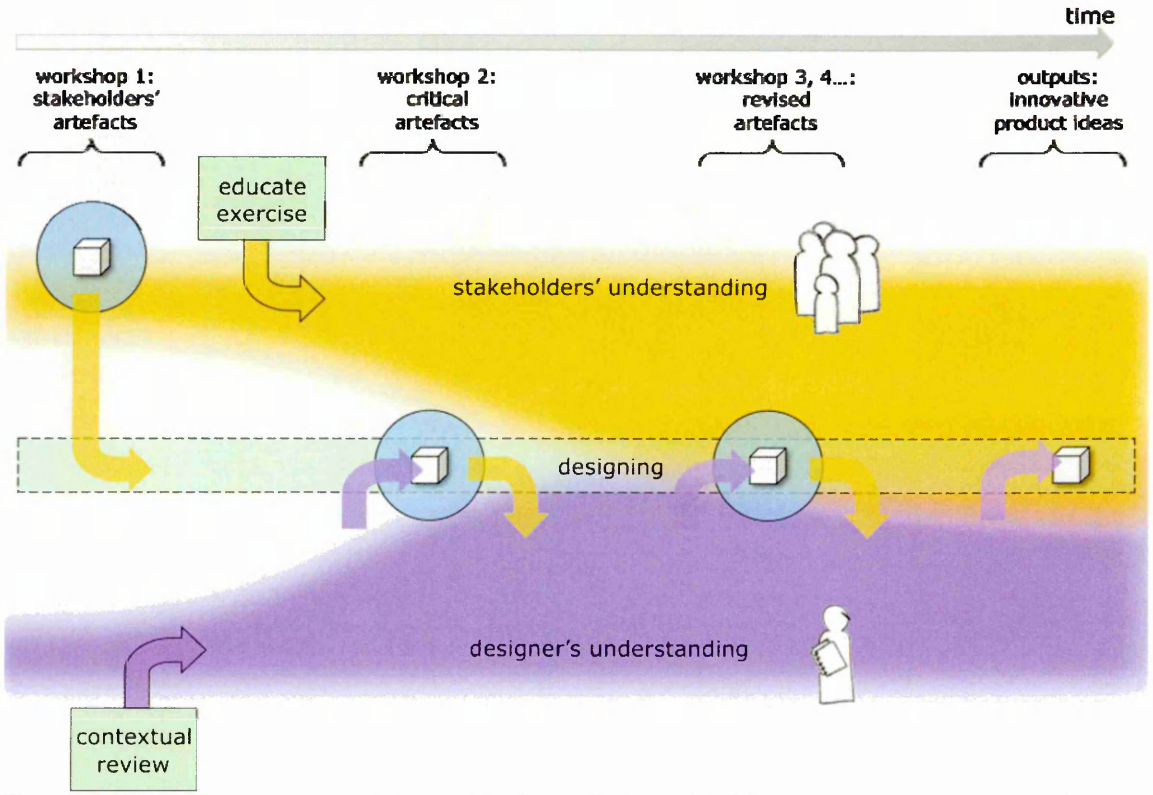

Figure 6.7 a design process using a critical artefact methodology
Developing from Figures 6.4-6.6

Figure 6.7 illustrates a design process that uses, and consequently provides a model of, a critical artefact methodology. The model illustrates how the stakeholders' and designer's understanding develops over time, and the function of the artefacts and workshops within this. Although the stakeholders' and designer's understanding overlap (as shown in Figure 6.5 and Figure 6.6), here, they are shown separately to illustrate the difference between the alternative possibilities suggested by critical artefacts and their existing understanding. This also illustrates that, in the early stages, stakeholders and designers are not engaged with each others' understandings and become engaged with each other's (broadening) understandings over time – arguably, in producing conceptual designs, the designer is ahead in 'closing this gap'[92].

[92] In her research into the transmission of craft knowledge, Wood (2006, p131) has developed a model which shows how expert and novice construct 'bridges' across the gap between their respective knowledge – the apprentice attempting to gain the knowledge of the master. The

In workshop 1 stakeholders and designer engage with the stakeholders' own artefacts. This engagement is clearly within the stakeholders' understanding but may be outside the designer's. The designer can then develop their understanding via participation in this engagement and processing of it via designing. As discussed in 6.3.1 (p176), the introduction of critical artefacts in workshop 2 suggests possibilities outside stakeholders' and designer's understanding, but by co-reading these artefacts as critiques, their understanding is broadened. Stakeholders and designers can then explore possibilities for products that fit within their broader combined understanding – products that they can comprehend as relevant to needs and wants/desires they may have previously been unaware of. In this respect the designed artefacts progress from being provocative towards being more 'prototypical'[93] of products satisfying stakeholder needs; from acting as critiques to broaden understanding to responding to stakeholders' and designer's combined understanding of relevant needs.

Figure 6.7 shows three workshops followed by a final expression of the designer's understanding via conceptual designs, as was the case in *Digital Mementos*, but it is conceivable that further artefacts and workshops might be used to refine the understanding gained.

The activity of designing was implicit in the model of innovation discussed in 6.3.1 (p176). It could also be said to be so here – designing as a continuous activity for processing and expressing understanding. However I have chosen to make it explicit in Figure 6.7 to give a sense of how it relates to the development of the designer's understanding. For instance, the artefacts express the designer's understanding (purple arrows) and the engagements with artefacts (blue circles) inform the designer's understanding via a process of designing (gold arrows). But it is important to note, as I discussed in relation to Figure 6.3 above, that these arrows do not represent an explicit transfer of information (such as direct embodiment of ideas, logical combination of comments and ideas), rather they indicate what activities and artefacts inform,

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initial discussion and artefacts in my model could be said to function as 'bridges' that allow designer and stakeholders to move into shared territory.

[93] As discussed in 3.6 (p69) and 6.2.5 (p173), 'prototypical' meaning implying a design direction or destination.

or are informed by, understanding. Again, the 'map (model) is not the territory' (see 6.2.2, p164), so for example stakeholders' engagement with artefacts also informs their own understanding but no arrows explicitly illustrate this in Figure 6.7. In this model, understanding emerges via stakeholders' and designer's subjective engagement, where designing affords the processing of this engagement and, in artefacts, the expression of the designer's understanding and critiques to broaden both stakeholders' and designer's understanding. As discussed in 6.2.4 (p171), the designer processes their participation in the engagement activities by dwelling in them (as Polanyi would call it) – appreciating the engagement activities (as the proximal term of a tacit knowing relationship) in terms of their affect on the design of further conceptual designs (as the distal term of this relationship).

Finally, Figure 6.7 shows two sets of supplementary activities that influence understanding: a contextual review that develops the designer's understanding of possibilities from design and research precedent; and education about the problem context and 'anything's possible' thinking exercises that enable stakeholders' effective engagement with critical artefacts (as discussed in chapter 5).

6.3.3 A critical artefact methodology: summary & application

At this point, I will summarise the critical artefact methodology proposed through the thesis. My intention is to provide a description of the methodology that can be read independently of the thesis, from which designers may gain insight into the application of its principles within their own practice. Hence I repeat some of the reasoning of a critical artefact methodology from earlier in the thesis but in a much reduced form, without detailed bibliographic references although the thesis chapters containing the fuller discussions are indicated in parenthesis. A description the *Digital Mementos* project (using my 'critical artefact methods') is given alongside to illustrate the methodology's operation and suggest how it might be deployed. The summary and methods text are presented together, the latter in boxed areas.

6.3.3.1 Suitable contexts

A critical artefact methodology provides a rationale for design methods focussed on radical innovation. It follows the ideals of human-centred design and participatory design in that it envisages designing for wider human needs (such as dignity rather than 'usability') and including a broader group of 'stakeholders' in the design process (rather than, say, 'users' alone).

The methodology is only appropriate where the aim is radical innovation – the design of radically different products (or systems and services) that question or break existing paradigms rather than more incremental, gradual improvements that fit within existing paradigms. The methodology offers a way of developing products (etc.) that satisfy stakeholders' latent or future needs (needs that stakeholders are unaware of, but recognise as relevant to them once satisfied). In order to develop such products, stakeholders and designers must engage with the *novel situations* such products afford: novel situations resulting from potential applications of new technology or alternative applications of existing technology – *novel products*; or novel situations resulting from potential new practices with no existing products to support them – *novel practices*. Both of these situations recognise that there is *potential* to develop something new; that the design of existing products is somehow lacking and does not account for all possibilities. A critical artefact methodology is geared towards exploring the novel practices and products that might satisfy stakeholders' future and latent needs. It is therefore less useful in other contexts.

(Fuller discussion in chapter 1)

My MA design project aimed to develop product ideas for the display, storage and organisation of digital photographs that utilised the possibilities of digital technology but went *beyond* familiar paradigms such as paper prints and computer monitors (an 'electronic photo frame', for example, fits *within* such existing paradigms).

The *Digital Mementos* project aimed to develop proposals for the digital equivalent of physical mementos – mementos constructed of digital technology

and/or using aspects of people's 'digital lifestyles' as mementos (such as mobile phone text messages).

6.3.3.2 Participation/observation informing design via designing

A critical artefact methodology relies upon three main principles:

- a holistic approach to participation/observation informing design;
- the use of artefacts as critiques; and
- a progression from 'provocative' towards more 'prototypical' artefacts relevant to stakeholders' needs.

As a participatory design methodology, this approach uses participation with and observation of stakeholders to inform the design of products (etc.) for those stakeholders. Within this, the stakeholders are not explicitly co-designers, rather their performances (what they say and do) inform what is designed. The designer *directly* participates in/observes a social situation (stakeholders and their performances with each other and their environment) with the intention of designing something that meets the stakeholders' needs. The aim of this participation/observation is not to produce a 'good' account of that situation; rather it is to design something 'better' (that improves stakeholders' lives). In attending *to* the design of such things *from* their participation/observation in a social situation, the designer gains an implicit or *tacit* understanding of that situation (and, consequently, of stakeholders' needs). Michael Polanyi's notions of tacit knowing and indwelling provide a useful description of how this operates.

Polanyi (1966) describes "tacit knowing" (that we can know something without necessarily being able to articulate it) as a relationship between two phenomena: the proximal which is appreciated only in terms of the distal. For example a carpenter is aware of the (proximal) muscular movements of hammering only in terms of the (distal) movement of the nail. Polanyi calls making something function as the proximal part of a tacit knowing relationship *indwelling*. For instance, when holding a stick to probe an environment, we quickly begin to appreciate the sensations of the stick against our skin in terms of what we 'feel' the stick touches – by *dwelling in* the stick/skin sensations we

appreciate them tacitly, in terms of the probed objects. The designer's understanding of a social situation can then be developed via a form of *indwelling*. The designer *dwells in* their participation/observation in a social situation by attending from it to designing, they then appreciate the situation tacitly in terms of what they design.

Designing then offers a way for a designer to 'process' their participation in and observation of a social situation. This has implications for how such a principle might be deployed. Firstly, the last stage should always be designing as each participation activity needs to be 'processed'. Secondly, the designer understands stakeholders and their needs predominantly in terms of what they have designed. The outputs are then these designed things, which express the designer's *tacit* understanding.

(Fuller discussions in chapters 3.7 and 6.2.4)

The participatory design method I used in *Digital Mementos*, and other projects, centres on a series of workshops interspersed with design work. The workshops consist of a group of stakeholders and the designer engaging with a set of artefacts or conceptual designs, usually in the form of a discussion of how the artefacts already or might fit into the stakeholders' everyday lives. Following these workshops, the designer then 'processes' their participation in the stakeholders' engagement by designing further conceptual designs. As designing always follows the stakeholders' engagement, the cycle begins with a workshop and ends with a final round of designing. However, this means nothing will have been designed before the first workshop, so this workshop should use a set of existing artefact associated with the context.

In *Digital Mementos*, a group of stakeholders attended a series of three, one-hour workshops. For the first workshop, stakeholders were asked to bring two objects (or pictures of objects that were valuable or impractically large) that they would like to put into a (hypothetical) 'time capsule', to be opened in 20 years' time. Stakeholders were then asked to present their artefacts together with their reasons for choosing them. This stimulated an open, informal discussion amongst the group – including the designer (me) – about memories, reminiscence and artefacts' roles within them. Following this workshop, I concentrated on designing a set of proposed 'digital mementos' influenced by

the themes I 'felt' were emerging or implied within the discussion and my understanding of the technological possibilities for such artefacts.

I presented four proposed 'digital mementos' in the second workshop, one at a time, each followed by an open discussion with and amongst the stakeholders, as prompted by the conceptual designs. Following this discussion, I designed another set of 'digital mementos' that developed the themes I felt appeared of most relevance to the stakeholders. I presented this second set of four 'digital mementos' in a third workshop, again one at a time followed by open discussion. This final discussion then informed my design of a final set of 'digital mementos' that I felt answered the stakeholders needs and want/desires. I will give a rationale for how the designer's (my) understanding of needs develops through this process next.

All of the *Digital Mementos* workshops were video-recorded using a wide-angle lens and omni-directional microphone to capture the actions and conversations of the whole group. I then used the video recordings to 're-immerse' myself in the discussions during the design phases.

6.3.3.3 Critical artefacts to foster innovation

A significant challenge in developing innovative products (etc.) is the difficulty engaging stakeholders in the novel situations they suggest. Stakeholders' responses tend to be limited by their existing experiences or, to re-phrase, their engagement reflects their assumptions of what design products *can be* (i.e. their roles, the experiences they afford, the world views they promote, their technological construction).

The conceptual designs used in the early phases of a critical artefact methodology have a particular character and purpose: they provoke stakeholders and designer to consider alternative possibilities for products (etc.), which then enables them to design innovative products that fit within a broader range of possibilities. This process depends on these conceptual designs being 'critical artefacts' – artefacts devised and employed as critiques.

Critical artefacts are intended to make people think rather than as practical solutions to obvious needs and wants/desires. They do this by expressing alternative or provocative possibilities for products and the social practices

associated with them that encourage their audience[94] to reflect on the assumptions inherent in what they consider possible or acceptable. Critical Design (Dunne 1999, Dunne & Raby 2001) and other 'critical design practices' have such critical artefacts as the *output* of their design practices, but a critical artefact methodology uses critical artefacts instrumentally *within* the design process to foster innovation.

Critical Theory is a complex field that seeks to both understand and transform society, but its general principles offer an explanation of how critical artefacts operate. Critical Theory suggests that the social 'status quo' reflects numerous contextual and historical factors; that people's unwitting assumption of these factors propagates power relationships that oppress them; and that enlightening people of these factors can emancipate them from such oppression. For design, this could be re-phrased as: designers' and stakeholders' unthinking assumptions about the role of design and its products leads to products (etc.) that 'oppress' them. For example assuming that design's role is to make 'usable' products does not cause society to question who that 'use' serves.

Critical Theory uses critiques to enlighten, and consequently emancipate, people – alternative explanations of society that prompt its members to reflect on the assumptions inherent in what they understand it can be. In a similar way, critical artefacts are 'artefacts-as-critiques' that express alternative product functions and roles, social practices and applications of technology to prompt people to reflect on the assumptions underlying what they consider possible. However for critiques to function, people need to *read* them, to intellectually engage with the values and ideas they embody. This relates to Critical Theory's proposition that theories both explain and constitute the social world – how we think about the world in part constructs that world so, to change the world, think about it differently. For critical artefacts to function similarly, stakeholders and designer should then *co-read* them – engage in broader

[94] Critical artefacts are also generally not intended for manufacture and sale, and often disseminated through exhibition and publication; the term 'audience' is therefore perhaps more appropriate than 'users' or 'stakeholders' here.

thinking about their inherent values and ideas rather than a more mundane evaluation of the resolution of their form and function.

Critical artefacts are then radically alternative possibilities for design products that prompt stakeholders and designers to reflect on their unwitting limitation of these possibilities and enable them to explore a broader range of possibilities for innovative products.

(Fuller discussions in chapters 1.2 and 4)

One of the critical artefacts I presented in *Digital Mementos* was *Aroma-mouse* (see Figure 5.5, p147). *Aroma-mouse* is a device to put in a drawer to keep your clothes smelling fresh. It is also wirelessly connected to software on your home computer that sends it 100 pixel square 'mouse-eye views' of the website hyperlinks you have clicked on. Once discovered buried amongst your socks, you can click through stored 'mouse-eye views' on a small screen under the device and be reminded of your previous web activity – I gave the example of booking my wedding.

The stakeholders' initial responses to *Aroma-mouse* were to question the practical implementation of the device – namely, it might capture too many web links and would a manual selection of links be better? However as the discussion progressed the stakeholders began to explore possibilities that the critical artefact suggested, for example that someone might (at the time) not appreciate the significance of clicking on a web link that (later) becomes a memento of something else (one stakeholder described booking a memorable travelling holiday). Another stakeholder liked the idea of a device that could be discovered at random to create personal moments for recalling memories. Through the discussion of *Aroma-mouse* it became clear the stakeholders did not see it as device they wanted to use, but together we did begin to appreciate new possibilities for digital mementos such as devices being discoverable by serendipity and the potential of 'traces' of people's digital lifestyles to act as mementos.

The challenge in using critical artefacts is to ensure the right form of stakeholder engagement with them – i.e. a reading rather than an evaluation. The methods I used in *Digital Mementos* facilitated this in several ways:

- I ensured that stakeholders understood their role in the workshops and overall design process. The workshop activities were described as a 'dialogue' between the stakeholders (as 'users') and the designer (as a designer) to explore what the design of digital mementos might be. The critical artefacts were then described as 'conversation starters' to prompt an open discussion of them;
- I undertook some preliminary activities with stakeholders prior to the presentation of critical artefacts in the second workshop. Recognising that I may have been aware of particular aspects of the context unknown to the stakeholders (such as developments in the technologies, systems, services and practices that support it), stakeholders needed some education of this knowledge so that they would not dismiss concepts initially due to ignorance of the context. Also contemporary life tends to make people engage with the world in a predominantly practical, mundane manner ("is this any use to me now?", "how real is this – does it resemble anything I've experienced before?", "why would I want one of these?"), such attitudes could prevent stakeholders from engaging with the concepts in a more open manner ("what would it be like experiencing this?" "would I want one of these?"). So stakeholders needed some activities to exercise their open-minded, imaginative thinking; exercises in 'anything's possible' thinking, so that they can engage with the concepts in the manner of 'what if?..'. To this end, I gave a PowerPoint presentation with graphs illustrating the rise of wireless internet access and the proliferation of digital cameras, and a series of images contrasting previous visions of the future with contemporary examples of similar artefacts (such as the Star Trek communicator and contemporary mobile phone) to remind stakeholders that, sometimes, 'anything's possible';
- The engagement activities were conducted in an environment that promoted open, informal discussion – my home (although we could have used any setting associated with informal socialising, such as a café). Bringing stakeholders together as a group enables the discussion to flow freely. Ideas raised by one stakeholder can prompt ideas from other stakeholders and enable the group to build a richer picture of the

possibilities of the conceptual designs. Groups of between four and eight seemed to work best in this respect. Any fewer and the flow of ideas is hampered, any greater and there is a likelihood of multiple, overlapping conversations;

- The critical artefacts were presented along with scenarios for their use, for example telling a story involving the artefacts using a series of photographs. This afforded stakeholders' engagement with the potential experiences associated with those critical artefacts rather than a simple evaluation of them as 'things'. Scenarios of use also suggest one potential experience rather than expecting stakeholders to imagine experiences 'from scratch', and the third party nature of scenarios enables stakeholders to discuss them more freely – people find it easier to talk about *other* rather than *self*;
- Finally, the characteristics of the stakeholders themselves also have an impact, which is discussed in relation to the methodology below.

(Fuller discussions in chapters 1.6 and 5)

6.3.3.4 Suitable participants

In selecting stakeholders to engage with the critical artefacts, two characteristics typify those who will better enable the designer to develop their understanding. Firstly they should be imaginative and open-minded. This enables them to engage with the artefacts in a useful manner – they can imagine what it would be like experiencing them and modify or extend these experiences. Secondly they should be 'in tune' with the possibilities of novel situations, they should be able to recognise the opportunities and challenges in novel practices and products. This enables them to recognise artefacts and scenarios relevant (and irrelevant) to their existing, latent and future needs.

In the critical artefact methods I developed from this methodology, I selected stakeholders' resembling 'lead users' as they were likely to be in tune with the possibilities of novel situations. Beginning with the work of Eric von Hippel (1986, 1988), there is a large amount of evidence to suggest that, in certain product markets, users rather than manufacturers are the source of innovation. These 'lead users' are characterised as those expecting to benefit

from innovating to satisfy their needs, and those experiencing needs ahead of the rest of the market. This qualifies them well to engage with novel situations. It has been observed that lead users only exist in markets where there is a rapid rate of product change and/or a wide variety of user needs. As the aim of a critical artefact methodology is radical innovation, it appears that such contexts are likely to have lead users.

(Fuller discussion in chapter 5.4)

Digital Mementos explored the design of digital devices for recalling memories that might also use digital artefacts (such as emails, text messages, photos, audio and video). The lead users (experiencing needs ahead of the market) could then be said to be people in the process of creating significant personal memories that they will want to document for the future who already create numerous digital artefacts in their personal lives. These lead users would also be people that use technology frequently because they are trying to satisfy a need, not because they are (necessarily) technologically inclined – they expect to benefit from innovation. These descriptions informed the criteria I used in selecting stakeholders for *Digital Mementos.*

Snowball sampling was used to identify 'friends of friends' who fit my 'lead user' criteria. I identified acquaintances likely to know others who matched two or more of three criteria: the two outlined above and a third of open-minded and imaginative people. I described the criteria to my 'recruiters' with example 'matches' (such as people who use web cams to communicate with friends and family overseas rather than because they like them as 'gadgets'). The recruiters recommended 13 potential participants; six were discounted for practical reasons, and I telephone-interviewed the remainder to check how well they satisfied the criteria. During this process I used an informal 'rating' matrix to reflect on their suitability.

I used a table to 'rate' the degree to which each potential participant matched each criteria on a simple scale of zero for no match, one for a moderate match and two for a strong match (anonymised excerpt shown in Table 6-1). Discussions with two of the recruiters also enabled me to derive their own 'ratings' of each of their potential participants. I then gave an overall rating based on my 'gut reaction' of each potential's suitability. I used these

ratings to support a final ordering of potentials' suitability via a 'traffic light' system: green for highly suitable, amber for moderately suitable and red for unsuitable. This ordering reflected an averaging of the ratings but was also weighted by my 'gut reaction' and notes about each participant. For example, although potential 3 rated zero for creating personal memories, their lifestyle and my impression of their character led me to believe they were an independent, open-minded thinker who would benefit the workshop discussions.

Of the seven interviewed, one potential was unavailable to participate, leaving two greens and four ambers as a group of moderately to highly suitable participants, according to my criteria.

Table 6-1 matrix for rating suitable participants

	Digital artefact user/creator		Creating personal memories		Imaginative and open minded		Gut reaction	Notes
	Recruiter	Me	Recruiter	Me	Recruiter	Me		
Potential 1	1	2	2	2	2	2	2	Alternative approach to recording memories – audio.
Potential 2	2	1	0	1	2	2	1	Alternative lifestyle, comics, sub-culture.
Potential 3		2		0		2	2	User but not fan of technology (hand-me-down mobile, uses film and digital cameras as appropriate). Keen cyclist/walker rather than driver.

6.3.3.5 Progression from provocative to 'prototypical' artefacts

Not all the artefacts used in a critical artefact methodology are critical artefacts. In fact, if the methodology is to produce innovative and human-centred products (etc.), it depends on a *progression* from provocative (critical) artefacts, in the early stages, towards increasingly 'prototypical' artefacts in later stages. This progression corresponds with the need to move from exploring new

possibilities for products to determining which novel products satisfy stakeholders' existing and future/latent needs. Stakeholders' and designer's reflection on their (previous, unwitting) limited view of possible design products is not sufficient; they must go on to explore what products and associated practices satisfy needs they appreciate as relevant. *Relevance* relates to how what is designed using a critical artefact methodology could be said to be 'better'. 'Better' according to whom? If the outputs of such design methods are to be human-centred, they should satisfy their stakeholders' needs and wants/desires. These needs and wants/desires are not static entities that the designer can discover, rather they are the stakeholders' personal interpretations of what they need/want. The designer's understanding of the needs and wants/desires are then another interpretation. So, the measure of the design process' outputs is what stakeholders and designer interpret, between them, as relevant.

A progression from provocative towards 'prototypical' artefacts facilitates the development of relevant products. The variety of ways artefacts are used in design methods generally can be classified according to the intention of these uses, and how this relates to the character of the artefacts and the manner in which stakeholders engage with them. Firstly, the intention varies from open exploration to closed testing of ideas and proposals. Artefacts' character also varies from being provocative (of either intellectual reflection or performances) to being 'prototypical' in the sense of suggesting a destination or direction for what is being designed. Prototypical artefacts[95] have aspects (form, function, construction, user experiences etc.) that their designers expect to appear, in some form, in the finished design. The aspects of provocative artefacts relate to themes and scenarios their designers wish to explore rather than being (necessarily) aspects that might appear in a finished design. The character of artefacts correlate with their intended use: generally provocative artefacts are used for exploration and prototypical artefacts are used for testing. Finally, stakeholders' engagement with such artefacts varies between three forms: critically reflecting on the ideas expressed within them; using them (their

[95] I avoid the term prototype as it has a number of interpretations and historical associations that might confuse the distinctions I am making.

attention being on the resulting activity); and evaluating them (their attention being on the artefact itself). There is also some correlation between artefact character and the type of engagement: provocative artefacts tend to result in critical reflection and/or use whereas prototypical artefacts tend to result in use and/or evaluation.

A critical artefact methodology uses provocative critical artefacts, at first, to broaden stakeholders' and designer's understanding of possibilities, and, later, gradually more prototypical artefacts to resolve and evaluate products that meet relevant needs and wants/desires. In part, the designer explicitly changes the character of the artefacts to ensure this progression, but it is also afforded by their increasing understanding – they begin to develop a 'feel' for solutions relevant to stakeholders' needs. The later artefacts are not necessarily an evolution of the critical artefacts, as might be the case with iterations of prototypical artefacts, rather they are a revised attempt to design for the context.

Critical artefacts are provocative versions of 'how things *could* be' that enable stakeholders and designer to consider broader possibilities for 'how things *could* be' and, consequently, to explore 'how things *should* be'. As the process advances, the designed artefacts become expressions of the understanding gained as possibilities for 'how things *should* be'. Artefacts are both the tools of the enquiry and its output. The designer's participation in engagement activities informs their tacit understanding of stakeholder needs. This understanding is 'processed' and expressed by designing further artefacts. Stakeholders' engagement with these artefacts can then confirm the designer's understanding embodied in them. So, in moving from 'provocative-ness' towards 'prototypical-ity', or 'criticality' towards relevance, the artefacts' role changes from tools for exploring relevant stakeholder needs to tools for reinforcing understanding of these needs, and, ultimately, tools for communicating these needs.

(Fuller discussions in chapters 1.7 and 3.6)

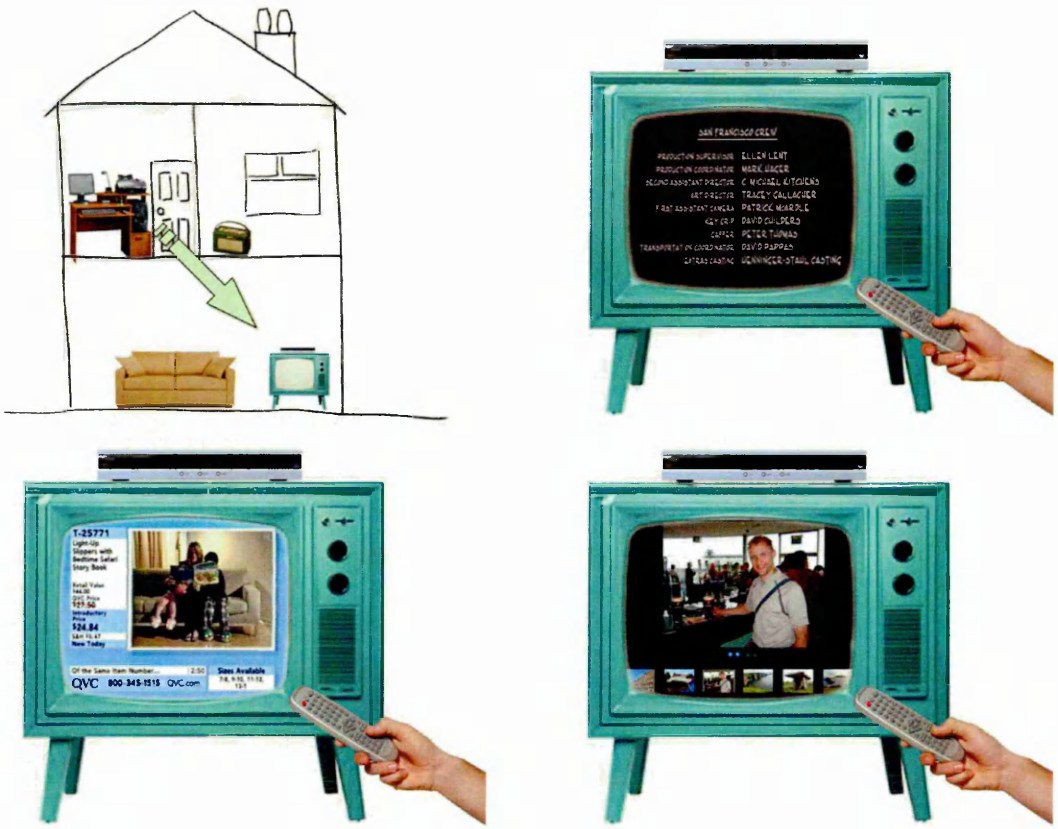

Figure 6.8 images from the *Channel Pix* presentation

Channel Pix (Figure 6.8) is one of the second set of artefacts that I presented to stakeholders in the third *Digital Mementos* workshop. It developed the idea of serendipitously discovering digital mementos that I had begun to appreciate in the second workshop (discussed above) but also proposed a product I thought stakeholders could imagine using in 'real life'.

Channel Pix is software running on your digital television or set top box that also communicates with your home computer via your home network. *Channel Pix* sits in the background unless you change television channel numerous times within a minute, when it 'recognises' that you might be bored and displays a photo from the collection on your computer. You can then choose to look at these photos by pressing the red button, or just change channel to continue 'surfing'.

The stakeholders all liked this artefact and imagined they would use it often. They also liked: the idea of *Channel Pix* prompting them to do something more meaningful with their time (looking at memories) rather than "wasting time" idly watching whatever television programmes happened to be on; and

its ability to make digital photographs, rarely viewed when on a computer, more 'accessible'.

The stakeholders' responses show the artefact satisfied needs they appreciated as relevant to them and that it also prompted some further reflection (on TV watching as wasting time). But their discussion also suggested improvements to the 'prototypical' artefact to resolve into an actual product. For example, a stakeholder talked about using their TV's electronic programme guide (EPG) to browse programmes rather than 'channel surfing', this suggested that *Channel Pix* might also monitor EPG use to recognise 'boredom'.

6.3.3.6 Outputs

As discussed at the beginning of this summary, the outputs of a critical artefact methodology are the final set of designed artefacts. These outputs embody the designer's (often, tacit) understanding of how to design products and systems that afford novel situations (as discussed above) whilst also satisfying relevant (existing and latent/future) stakeholder needs. So these outputs are not necessarily fully resolved products, rather they are expressions of opportunities for design. These opportunities are expressed via conceptual designs that demonstrate *an* application of the designer's understanding whilst not necessarily being the *most appropriate* or *fully resolved* application. The outputs are then a form of 'data' that can be fed into further design activities – the development of resolved products and systems. However, the more times the cycle of stakeholder engagement informing design is gone through, the more resolved these outputs are likely to be.

In *Digital Mementos*, the aim was to develop ideas for what digital mementos as products and systems might be. The final set of artefacts was therefore intended as 'pointers' for further design work, to outline opportunities for further development rather than be finished products.

Figure 6.9 *Txt Box*

Txt box (Figure 6.9) is one of the outputs from *Digital Mementos*. It is a device for keeping your personal 'clutter' – keys, loose change and mobile phone. It can also wirelessly connect to your phone and store items from its memory. When you pick up your phone on the way out of the house in the morning, *txt box* might display an appointment from your phone's calendar or a text message that you have kept on the phone for longer than six months. In the illustration I showed a text message from a friend that I received the morning after my first date with my (now) wife.

Txt box is not resolved in terms of its appearance or technological construction, but it does suggest a product that affords serendipitous discovery of traces of people's 'digital lives' (text messages) that then act as mementos.

6.3.3.7 Suggested deployment

A design project applying a critical artefact methodology *might* consist of:

- A series of three, one hour discussion workshops;

- With a group of six stakeholders who have been selected according to their resemblance to 'lead users' in the context and their open-minded, imaginative nature;
- In the information given to stakeholders, and at the beginning of each workshop, they are told that the project is about "exploring what the design of X might be" via a 'dialogue' between themselves as 'potential users' of X and the designers as 'designers' of X. And that this dialogue will centre around a series of artefacts;
- In the first workshop, stakeholders are asked to bring in their own artefacts which are related to the context and discuss their experiences with these artefacts;
- The designer participates in all three workshops which are videotaped for later review;
- At the beginning of the second workshop, stakeholders are given a short presentation of salient information about the context and a reminder of how they have previously believed 'anything's possible' – such as via science fiction and utopian imagery;
- Following each discussion workshop, the designer develops a set of artefacts plus example scenarios for their use. The nature of these artefacts progresses from being highly provocative or critical in the first stage towards expressing relevant stakeholder needs as the designer's implicit understanding of these needs develops. The second workshop artefacts are critical artefacts, the third workshop artefacts suggest relevant stakeholder needs, and the final 'output' artefacts refine and communicate the designer's understanding of relevant stakeholder needs;
- The designer 'processes' their participation in the engagement activities by designing further artefacts. The video recordings aid this by allowing the designer to re-visit and re-immerse themselves in these activities. The resulting artefacts develop and express their tacit understanding of the context;
- The outputs are the final set of artefacts that illustrate 'opportunities for design'. These concepts demonstrate applications of the designer's

understanding and are effectively 'data' for further design work resolving the insights into final products (etc.).

6.4 Evaluating a critical artefact methodology

Through my discussion above, I have clarified the nature of critical artefact methods as I experienced them in *Digital Mementos* and proposed a critical artefact methodology that describes their operation. Having arrived at a working definition of a critical artefact methodology, it was necessary to determine whether other designers can understand it and make practical use of it. This usefulness can be evaluated in two questions: does a critical artefact methodology provide methods that can be comprehended and adopted by designers, and do these methods produce results that are valuable within design projects – are critical artefact methods something designers can use, and is it worth them using them?

6.4.1 *Digital Mementos* presentation to designers

To answer the two general questions outlined above, I presented the results of *Digital Mementos* to a group of three professional designers, none of whom I had previously worked with or were familiar with my research:

- Mark is design director of Design Futures (and has been for 10 years), Sheffield Hallam University's commercial design consultancy – managing diverse design projects across sectors that include automotive, consumer, digital, fast moving consumer goods (FMCG), and medical products with brands such as Adidas, JCB, Kodak, Panasonic and Unilever;
- Gordon is an experienced tutor on Sheffield Hallam University's undergraduate and postgraduate design courses with four years' previous experience as a full-time design consultant working with diverse clients such as HSBC, Sainsburys, Boots, CarnuadMetalbox, Santon (IMI), Hepworth and Polypipe, and ongoing part-time design consultancy for Design Futures (above) with diverse clients such as Marks & Spencer, Gillette, Procter & Gamble, and Mediplan;
- Peter is an experienced tutor on Sheffield Hallam University's undergraduate product design courses with four years' previous experience

in industry including working for Philips on the design of medical imaging products and electronic communication devices, then for a UK design consultancy on diverse medical products (ranging from taps for urine bags to blood gas monitors for operating theatres).

Additionally, Mark and Peter had both worked with companies dealing with novel or emerging technologies.

In an informal 'round table' setting I presented a slide show of diagrams and design illustrations (using PowerPoint) that outlined (briefly) my critical artefact methodology, the critical artefact methods used in *Digital Mementos* and their results: the 'opportunities for design' themes and the final conceptual designs that expressed these themes (as discussed in 6.2.1, p161 and included in Appendix C). The conceptual designs were illustrated using photographs and sketches to present scenarios of their use.

The session lasted one hour, approximately 30 minutes each for the presentation and discussion, and was audio recorded for later reference. Immediately following the session I made notes about the discussion and, later, transcribed the discussions in full.

Before the presentation of the conceptual designs, I asked the designers to bear in mind three questions, which I repeated at the end of the presentation:

- do the conceptual designs have potential?
- do they seem relevant to users' needs?
- could they be resolved into real products?

During the last five minutes of the discussion, I also asked the designers their opinions on the method I used, whether they thought it was 'workable'. My reflection on the discussion, via transcription and my notes, allow me to suggest some answers to these questions.

The designers did not answer the three initial questions directly, however their responses did indicate whether they recognised the *Digital Mementos* results as being useful (human-centred, relevant, potential for further development as human-centred products), and, as a result, if they could see the value of a critical artefact methodology (as a 'design-led' approach) as a way of producing this information – i.e. something they could imagine using.

The designers recognised the results as being interesting and useful, which can be seen from their approval of specific conceptual designs, for example Peter referred to the functionality of the *Channel Pix* concept as a "good idea", Gordon also liked this concept: "I could see a lot of potential in that", and Mark liked the functionality of *Mem-tabs*.

It can also be inferred from the nature of the designers' discussion. They were immediately engaged by the ideas presented, their first comments were that the conceptual designs and output themes were "really interesting" and Mark later says, "well I recognise a lot of that stuff" in relation to the problems and solutions expressed. The designers were also enthusiastic about the conceptual designs, they were inspired, as designers, to imagine and suggest how they could be extended and/or constructed. For example Gordon discussed additions to the *Mem-tabs* and *Channel Pix* conceptual designs. The latter led to a wider discussion amongst the designers of how classifying photos for storage and retrieval is inherently a subjective process.

This enthusiasm and engagement continued as evidenced by the designers' tendency to imagine how each conceptual design might work and any problems that could surface as a result. For example, in discussing *Mem-tabs*, Gordon suggests they would be bad at labelling surprise events, Mark goes on to explore options to "combat" this problem, and Gordon extends his suggestion. I was explicit that the conceptual designs were not final products, but the designers' discussion makes it clear that they do function as 'pointers' towards the development of actual products – the designers accepted the conceptual designs as being tentative and focussed on how to make them work.

Comments Mark made about the overall quality of the conceptual designs offer the strongest validation of the results' usefulness. Mark referred to the large interest in developing products for managing personal digital media from numerous manufacturers due to the convergence of digital devices; and that it would be those products that most fit "human ways of [..] being reminded" that would be more successful. He referred to the *Digital Mementos* conceptual designs as being "more close to human things" than the technology or engineering-led products that he had encountered.

At a later date, I asked Mark to further qualify his comments by expanding upon his basis for making them – in comparison to *what* were my conceptual designs 'more human'? In our ensuing discussion, he suggested that his comments were made in the light of his knowledge of electronic product development as obtained through: industrial experience, including work with Matsushita[96] and Kenwood; a familiarity with design management literature[97]; and his appreciation, as a designer, of the 'mindset' evident in current electronic products, citing as examples the digital cameras he had recently purchased. Mark suggested that the operation of electronic products that continue to come to market tend to embody a particular 'mindset' – they reflect a "logical" or "straight-laced" way of organising and implementing device functions that appears more closely related to how the products are technically constructed rather than how people might use them[98], for example the way in which digital media is organised and accessed. His opinion was that functionality and interactions were handled in a clearly 'more human' manner in my *Digital Mementos* conceptual designs than was evident in existing electronic products and are likely to be produced by current industrial product development methods.

So, according to these designers, the final conceptual designs suggest *human-centred* 'digital mementos' products – they embody a human-centred understanding of what is required and are 'pointers' towards the development of actual products.

During the last five minutes of the discussion, I also asked the designers their opinions on the methods themselves, whether they thought they were 'workable'. This was an attempt to draw out whether designers could comprehend my critical artefact methodology in terms of relevant methods in their own practice, and whether they saw these methods as being useful – could they imagine using the methodology?

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[96] Mark has worked with Matsushita in recent years as part of an external design consultancy and, in the early 1990s, internally within their new product development teams in Japan.
[97] Such as the publications of the Design Management Institute:
http://www.dmi.org/dmi/html/publications/pubs_d.jsp
[98] This perception is very similar to Agre's (1997) observation of the limitations of Artificial Intelligence design (and technical systems' design more generally) by the "substantive metaphors" assumed in their technical construction (also discussed in 4.2.4, p100).

The designers did, in general, comprehend the methods used in *Digital Mementos*. Gordon asked about how the workshop discussions were begun – what got the stakeholders' process of open-minded thinking "started". And Peter mentioned they would liked to have understood more about the nature of the artefacts used at each stage in the process, with example artefacts (he accepted that the session's limited time meant that I could only give a brief overview of the methodology). However, in addition to these clarifications, what demonstrates the designers' comprehension of the methods is their discussion of their limitations and potential pitfalls – in order to unpick the methods' facets, they needed to comprehend them. For example Gordon suggested that the "start point" was the most difficult – getting stakeholders into a suitable open frame of mind. He also recognised that the methodology was best applied where the design brief was wide (noting a rarity of such cases in commercial practice). The designers also suggested that it is difficult to defend any participatory approach versus working alone – 'talented designers' might come up with the same ideas independently – we agreed that this participation was useful in that it had 'in-built' validation of the ideas by stakeholders.

The designers also comprehended that critical artefact methods do not produce final products, rather informs their development by embodying understanding about stakeholder needs in the conceptual designs. Mark noted the approach "is mainly about the ideas, and that's where it's valuable". So, although our discussion of the methods did not specifically answer whether the designers could imagine using them, the designers did see the methods as valuable.

6.5 Conclusion

My discussion in this chapter has produced a description of a critical artefact methodology as I understand it and have applied it in the *Digital Mementos* project. I have also described how I explored whether the methods resulting from it were of practical use to designers. In my concluding chapter I will summarise the research that produced this critical artefact methodology; reflect on my research methods (and methodology) and the limitations of the

knowledge produced; position the research (and my critical artefact methodology) with respect to other work; define my contribution to knowledge; and suggest directions for future work.

7 Conclusions

7.1 Introduction

In short, the contributions to knowledge of my research are:

- a critical artefact methodology; supported by
- a description of effective critical artefact methods and their practical use;
- (embodied in this methodology) a more instrumental use of critical artefacts than is apparent in other critical design practices; and
- (in *Digital Mementos'* outputs) exemplar findings demonstrating the value of a critical artefact methodology's application.

In this chapter I will expand on these contributions and indicate the discussions within the thesis that support them. Then, by revisiting the research methodology and research methods that produced these contributions, I will discuss their limitations. The similarity of my research methodology to Action Research indicates the direction for future work developing a critical artefact methodology, which I will discuss in the final part of the chapter.

7.2 Contributions

7.2.1 A critical artefact methodology

In this research I have developed a rationale for using critical artefacts to foster the innovation of human-centred product ideas. These ideas are innovative in the sense of questioning the roles of design and its products in everyday life and suggesting new product paradigms; yet producing these ideas via an understanding of *relevant* stakeholder needs (existing, future and latent). Whilst not necessarily being fully resolved products, these ideas are starting points for their design – they are the designer's insights into stakeholders' needs and consequent 'opportunities for design' expressed in conceptual designs (*Digital*

Mementos' end products are included in a PowerPoint file on the Appendix C CD-ROM).

I developed this methodology from my practical experiences of deploying it in a series of design projects and a contextual review. Devising and applying (tentative at first) critical artefact methods and reflecting on their operation in relation to existing practices and theory enabled me to develop a rationale to support these methods (as discussed in chapter 6).

Artefacts (and scenarios of their use) are central to this methodology. Akin to Gaver's cultural probes (see 3.5.2, p64) they prompt reflection in designer and stakeholders; they are used to engage stakeholders in creative thinking about novel situations and possibilities, and to develop and express the designer's understanding. A key principle is the use of 'artefacts-as-critiques' (critical artefacts), being the products of critical design and having an equivalent function to critiques in Critical Theory.

Critical Theory is a complex and varied field yet Calhoun, Crotty, Dant and Geuss' descriptions of it show its common belief: that the status quo limits society and its underlying factors should be questioned (as discussed in 4.3, p103). Critical theories thus aim to change society because, as Calhoun suggests, they both explain and (partially) constitute the social world; and Calhoun and Dant suggest that critiques, as the products of such theories, facilitate such change (as discussed in 4.3.3, p106). Critical design and other critical design practices (as I refer to them) share this questioning of the status quo via critiques in the form of artefacts (as discussed in 4.4, p116).

Dant suggests that critiques' only effect is via those that engage with their products (texts), their intellectual engagement with the critiques' ideas (such as alternative explanations of society) – a *reading* of the critiques (as discussed in 4.4, p116). Similarly designer's and stakeholders' *co-reading* of critical artefacts enables them to explore alternative possibilities for needs, wants/desires, practices and products by broadening their understanding of what is possible (as discussed in 4.4, p116 and 6.3.1, p176).

This critical artefact methodology is related to existing forms of Participatory Design in that stakeholder participation *informs* design activity rather than is a co-creation activity (as discussed in 3.4, p56).

Artefacts facilitate this participation in a particular manner. Ehn & Kyng's mock-ups and Gaver's cultural probes are exemplary uses of artefacts to engage with stakeholders that do not fit the notion of 'prototypes' (that suggest a design direction or destination) – they provoke performances and reflection respectively rather than evaluation (as discussed in 3.6, p69). My critical artefact methodology depends upon a progression of the artefacts from being provocative towards being more 'prototypical'; a progression from critical artefacts (that provoke critical reflection) towards artefacts expressing relevant needs, as recognised by the stakeholders, (that afford evaluation) (as discussed in 3.6, p69 and 6.3.2, p182).

Within this methodology, this progression is enabled by the designer's 'processing' of their participation in the stakeholder engagement activities by designing further conceptual designs. In devising numerous design concepts, the designer develops and expresses their understanding of stakeholders' needs; as such this is a form of Polanyi's *indwelling* – dwelling in the particulars to appreciate the whole (as discussed in 6.2.4, p171).

7.2.2 Critical artefact methods

I developed my critical artefact methods through their use and evolution in design projects: the preliminary work, *Living Rooms* and *Digital Mementos* (as discussed in chapters 1 and 5). My reflection on the methods in action enabled me to outline suitable engagement activities, design projects, and participants (as summarised in 6.3.3.7, p200). Von Hippel's work demonstrating lead users as likely sources of innovation provided a strategy for identifying suitable participants (as discussed in 5.4, p141), and *Living Rooms* highlighted a need to educate stakeholders in the context and exercise their open-minded thinking (as discussed in 5.3, p139).

Given that these methods were produced via specific projects, their generalisability could be questionable. To deal with this point, I will review my research methodology and the consequent limitations of my findings below (7.3, p211).

7.2.3 A more instrumental use of critical artefacts

I have employed similar tactics to critical design in producing critical artefacts – the creation of 'artefacts-as-critiques'. However, where critical reflection (afforded by critical artefacts) could be seen as the end point of critical design (or rather, the emancipation such enlightenment aims to foster, to use the parlance of Critical Theory), this critical reflection is used more instrumentally in a critical artefact methodology – to broaden designer's and stakeholder' view of possibilities, and as part of a progression from challenging, alternative proposals towards relevance. In this respect, a critical artefact methodology is less vulnerable to the criticism of elitism levelled at Critical Theory (and, by implication, critical design) – critical artefact methods aim to determine what is relevant, not impose a view (the 'avant-garde designer's'?) of 'a better world' (as discussed in 4.5, p121).

7.2.4 Exemplar findings demonstrating value

The final conceptual designs produced as the outputs of *Digital Mementos* (included in Appendix C) provide an exemplar of critical artefact methods in operation and the value of a critical artefact methodology's application. This was substantiated by the positive reaction of professional designers to these outputs (as discussed in 6.4, p202).

Such exemplars may also prompt designers' insights into relevant techniques within their own professional practice. This affects what claims I can make for generalisability and will also be discussed below in 7.3.2 (p213).

7.3 Limitations: research methodology revisited

In chapter 2 I discussed my research methodology and research methods, noting that, to some extent, this research methodology emerged through the practical work rather than being in place prior to it. I used (or adapted) research methods that I felt were appropriate to the aims of my enquiry, as it evolved, rather than strictly adhering to a particular methodology. The research methodology that did emerge was very similar to Action Research (as discussed

in 2.2, p34), which I will demonstrate further below, but first I will review my research methods.

7.3.1 Research methods

I outlined my research methods in chapter 2 and noted that a fuller description of them would be provided in the remainder of the thesis. There are also particular instances, worth noting here, where my use of research methods reflected the nature of the enquiry.

In dealing with the video recordings of discussion workshops, as discussed in chapter 5, I did not use a formal coding scheme to analyse the transcriptions. Rather, the process of making the transcriptions allowed me to 're-immerse' myself in the experiences of participating in these workshops. This facilitated my reflection on the effectiveness of critical artefact methods in *Living Rooms* and enabled me to suggest implications for their improvement. I reflected on the effect of these implications in *Digital Mementos* using another cycle of transcribing as 're-immersion'. My comparison between the two projects was not purely via reflection on my experiences, as facilitated by transcribing them, I also used a 'light touch' analysis of the transcriptions to back up my experiences. Crucially this analysis did not use an objective scheme for coding the discussions, rather it was based on an informal coding scheme that I devised related directly to the nature of the enquiry – categories of stakeholder engagement according to how much they did (or did not) contribute to a discussion that I felt moved the design process forward (see 5.6.1, p153 and 5.6.2, p156). This analysis was driven by the aim of improving the critical artefact methods, not a desire to comprehensively explain the discussion workshops.

No formal coding was used, either, in my reflection upon my experiences participating in *Digital Mementos* (discussed in 6.2.2, p163). In diagrammatically mapping the operation of critical artefact methods in that project, I did not look for particular elements in the transcriptions, rather I followed an 'emergent coding' scheme. The elements that I drew out from my experiences and then mapped emerged from my reflection of those experiences. But again these elements were focussed on the aim of the enquiry – they were the

elements I needed to illustrate how the resulting insights and conceptual designs developed.

And in selecting 'suitable participants' for *Digital Mementos* (as discussed in 5.5.2, p149), my aim was to increase the possibility of critical artefact methods working well.

These examples of my research methods and their relationship to the nature of the enquiry have parallels with my discussion of participation/observation to inform design in chapter 3.7 (p74): 'Design-led' participation in social contexts aims to change or improve those contexts (via 'better' design products) whereas 'social science' participation aims to produce a 'good' descriptive account of them. Similarly, some of my research methods aimed to improve critical artefact methods not produce a descriptive account of them. This might appear problematic, unless the research, like Action Research, aims to produce action/change (critical artefact methods) as well as research/understanding (a critical artefact methodology). Therefore I will move on to review the similarities of my research methodology to Action Research.

7.3.2 Action Research and rigour

As I also discussed in chapter 2, Archer and Swann propose that design practice can be a valid form of research providing it operates as a form of Action Research. In the light of the research methods I used, re-visiting my research methodology and reviewing its similarity to Action Research consequently allows me to discuss any claims I make for the research findings.

As discussed in 2.2.1 (p35), Archer suggests that design practice (as a practitioner activity) can count as research providing it is knowledge directed, systematically conducted, with unambiguously expressed research questions, transparent methods, recorded data or observations, the whole published and critically examined, and the knowledge outcome transmissible. I can confidently state that my research is directed towards acquiring knowledge (of practical design methods and a design methodology), and that, via this thesis (and previous and subsequent publications), the research (as a whole) is published and will be critically examined. Archer's remaining criteria deal with

the rigour in which I conduct and document my research, and the nature of my findings – their 'transmissibility', which relates to their generalisability as I will discuss later (7.3.3, p217). The former criteria is similar to Swann's requirement for design practice, as Action Research, to be systematically cyclic – by making the steps within the research process visible and the researcher being self-critical of their role within them (as discussed in 2.2.2, p37).

In his criteria, Archer suggests that research questions should be unambiguously expressed. In chapter 1, I discussed how the preliminary work provided the impetus for my PhD research: the development of a new design methodology based around the use of critical artefacts. I did not explicitly translate this aim into a set of research questions[99]. However I did set out an outline of a critical artefact methodology that I went on to test and refine in live design projects, and the methods I used in these projects evolved as required. So, the research proceeded from a general aim (to develop a critical artefact methodology) and specific research questions arose throughout the practical work as my research methods (and critical artefact methods) adapted – for example, the question "who are suitable participants for critical artefact methods?" arose following the *Living Rooms* project. Stating research questions as they arise is perhaps more appropriate in research, such as mine, where the enquiry develops through the progress of the work rather than being focussed at the start.

Both Archer and Swann suggest that research methods should be transparent – it should be possible for a reader to understand what activities took place and how they contributed to the enquiry. Swann relates this to the steps in an Action Research cycle, and extends the methods' visibility to include the design process itself – some evidence of how the designed things were created, an indication of 'where the ideas came from'.

My use of critical artefact methods is the design practice element of this research and equivalent to the *act* step of an Action Research cycle. In chapter 5 I discussed how the critical artefact methods were evolved from *Living Rooms* and then implemented in *Digital Mementos*, Appendix C contains the conceptual

[99] If I had, they might have been: What does a critical artefact methodology consist of? And does it provide valuable and useful practical methods for designers?

designs that were designed during *Digital Mementos*, and in chapter 6 I derive a critical artefact methodology from my practical experiences and contextual review. I have therefore made visible my act step (design practice), this step's operation (the progression of conceptual designs) and how it contributed to the enquiry (the development of a critical artefact methodology).

During and between the design projects I reflected on the effectiveness of the critical artefact methods used (as discussed, again, in chapter 5) and how they built my understanding of a critical artefact methodology (chapter 6). I used several research methods to facilitate this reflection (such as video recording, transcription, designing), which is equivalent to the *reflect* step of an Action Research cycle. My outlining of these methods in chapter 2, and discussion of their evolution in this chapter, makes visible these research methods and also evidences my self-critical role in participating in the design projects.

Archer also suggests that any data or observations should be recorded so that a reader might evaluate the researcher's arguments in reference to them. Although I have produced transcripts of the discussion workshops, the significant 'data' relating to the design projects have been my experiences of participating in them, as a designer, and the artefacts that have been designed. I have attempted to articulate these experiences through my discussions in chapter 6, and by identifying features I feel a critical artefact methodology shares with existing practices and theory in chapters 3 and 4. However, there will always be an element of these experiences that is tacit. Polanyi's notion of tacit knowing (as discussed in 6.2.4) offers a way forward in this respect. It may not be possible for me to express the aspects of my design practice that I experienced tacitly (as the proximal term of a tacit knowing relationship) but I can present the results of the comprehensive activity in whose terms I appreciated these aspects (the design of artefacts to 'process' my understanding of stakeholder needs). So, the *Digital Mementos* conceptual designs (Appendix C) are also a form of data in this research – they illustrate my understanding of stakeholder needs as it progressed through the project.

Swann suggests that design's (as field or discipline) concern with social practices (associated with products' use) aligns it with Action Research, but, to

produce outputs with similar claims to rigour, design practice should also involve participation of all relevant stakeholders in a manner focussed on emancipation. The stakeholders Swann refers to are all those who have a vested interest in the products of the design practice. This is suggestive of a form of human-centred design that I have already aligned a critical artefact methodology with (as discussed in 1.7, p26). Stakeholders do participate in critical artefact methods, and their participation is emancipatory in that critical artefacts function as critiques that afford enlightenment of their 'oppression' (due to having limited views of possible products and practices, as discussed in 4.4.1, p119).

However Swann discusses design practice as constituting the *whole cycle* of Action Research; as having equivalent plan, act, observe and reflect steps within it. He suggests that stakeholders should participate in each of these stages in the design process.

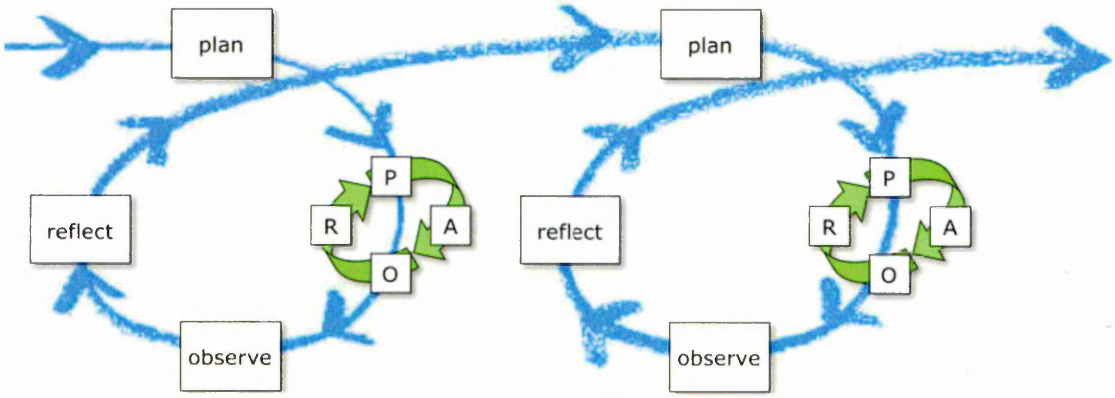

Figure 7.1 my research methodology as an Action Research spiral-within-a-spiral

My research methodology takes a step back, design practice is considered as the *act step* of the Action Research cycle – a design project that is reflected upon (*Living Rooms*) before moving to the next iteration of the cycle and a further design project (*Digital Mementos*). In relation to Swann's scheme, it is a 'meta spiral' above the existing Action Research spirals of design practice, see Figure 7.1. So, although stakeholders participate in the inner spiral of the design projects, they do not participate in the meta spiral of the wider research into a critical artefact methodology. However this may not be a problem as the stakeholders for inner and meta spirals are different. Stakeholders in the inner spiral, the design projects, are those with a vested interest in the designed

products (and, as discussed, I have included). Stakeholders in the meta spiral are those with a vested interest in the critical artefact methods and critical artefact methodology – designers and design academics (as discussed in chapter 2.1, p34). I have operated as both within this research, so satisfy Swann's criteria for the meta spiral in a limited way, but this does point to future work in developing a critical artefact methodology: including other designers and design academics (as stakeholders) in further iterations of the meta cycle, i.e. not just within the design projects.

7.3.3 Limitations: a methodology 'so far' and generalisability

My discussion of 'meta spirals' above points towards a limitation of the critical artefact methods presented here: they reflect my understanding of a critical artefact methodology *at this point.* I.e. my findings relate to the outputs of an Action Research spiral that could be extended to refine and expand this understanding (and concurrently foster further action – practical applications in design projects). As such, my contributions to knowledge are limited in that they reflect a critical artefact methodology as it is understood 'so far'. So, critical artefact methods may evolve as understanding of a critical artefact methodology develops.

Returning to Archer (1995), he suggests that design practice (as practitioner activity) that is equivalent to research activity is likely to be situation-specific; its research findings are specific to the context in which they were developed. So, according to Archer, my critical artefact methods are limited to the design projects in which I applied them. However there are elements of these applications that indicate how the findings may be generalisable. It is significant that I devised the critical artefact methods according to my particular skills, aptitudes and experiences – a 'designerly way' of problem solving. So, I can generalise to the extent that critical artefact methods are best suited for use by those with similar sensibilities (designers). It is also significant that the stakeholders with particular traits participated more usefully in the activities. Again, I can generalise here and say that imaginative, open-minded stakeholders, 'in-tune' with the possibilities of novel situations, more

effectively participate in critical artefact methods. I.e. I can generalise and say that critical artefact methods are 'not for everyone'.

Further, Swann (2002) notes that, although the findings of design practice as Action Research may be situation-specific, in inventing "new answers to conventional situations that transcend the ordinary" they can inspire new thinking. So, the critical artefact methods I present in this thesis may be specific to their applied projects but, as novel and alternative design and innovation methods, they can inspire designers to develop and adapt them for their own professional practice, and accordingly adopt a critical artefact methodology. This 'design solutions as inspiration' effect also deals with Archer's criterion for knowledge to be transmissible. In addition to the arguments presented in this thesis, the evidence of critical artefact methods in operation, and their resulting conceptual designs, may provide inspiring case studies that 'transmit' my insights to professional designers.

7.4 Future work

My discussion above of my research methodology and its similarity to Action Research (7.3.2, p213), and the limitations of the critical artefact methods and critical artefact methodology presented here (7.3.3, p217), indicated an obvious direction for future work developing a critical artefact methodology: the inclusion of other design academics and designers. To follow my development of Swann's proposal of design practice as Action Research as an inner spiral within a meta spiral (Figure 7.1), I can further my research into a critical artefact methodology by including other stakeholders in this meta spiral. I.e. including designers and design researchers not just within the design projects (the inner spiral), but also in reflecting on the effectiveness of critical artefact methods in those projects, improving those methods and planning their application in further design projects, and critically reflecting on a critical artefact methodology to support those methods (the meta spiral).

So, one avenue for future work is broadening the participants in the practical aspects of the research – developing and reflecting upon practical methods via their application. Another avenue would be to continue the investigation of existing theories and practices that might support this

empirical data in understanding a critical artefact methodology, i.e. that could aid the reflect step of the Action Research meta cycle. In the precedent I have discussed to some extent in the thesis there are some parallels that may be worth exploring further:

- Action Research, Critical Theory, and design practice could all be said to produce understanding and change *at the same time*;
- Human-centred design could be said to be a more 'critical' version of user-centred design – a critique of 'use' and 'users' aimed at enlightenment via a focus on human dignity (as Buchanan might put it);
- This might provide a rebuttal to 'social science' views of participation/ observation to inform design via descriptive accounts; and as such
- A critical artefact methodology, as 'design-led' participation/observation to inform design, may be closer to a more realistic idea of *concurrent understanding and change.*

7.5 The end (for now)

Bruce Archer's three possible relationships between research and practice offer a framework for summarising my research. I discussed these three relationships in chapter 2 and suggested that my research satisfied them all. Following my discussions above, this still appears to be the case:

- Research *for the purposes of* practice. I have described critical artefact methods and provided evidence of their effectiveness (including their conceptual design outputs), from which designers can appreciate a critical artefact methodology and adopt similar techniques relevant to their own professional practice;
- Research *through* practice. I have devised these critical artefact methods by applying them in live design projects, reflecting on their effectiveness and modifying them accordingly (akin to an Action Research spiral);
- Research *about* practice. I have reflected on my experiences of using critical artefact methods, as a designer, in relation to an understanding of others' practices and theories (of design practices and social practices) and produced a critical artefact methodology to support my critical artefact

methods – I have proposed a rationale for using 'artefacts-as-critiques' and for designing as a method of 'processing' stakeholders' engagement with such 'critical artefacts'.

The critical artefact methods presented here may evolve with further research, but they offer sufficient evidence of the practical and valuable application of a critical artefact methodology: using provocative conceptual designs to foster human-centred innovation.

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Appendix A Reference document for recruiters

(Note: This information was provided to recruiters of potential participants for the *Digital Mementos* project.)

I am after people who satisfy two or three of the characteristics below:

1. People who already use digital technology in their personal lives – they create lots of 'artefacts' that could later trigger memories – e.g. photographs, emails, even spreadsheets. But crucially, people that 'end up' using technology and computers a lot – they do so because they are trying to satisfy a need, not because they are technically-inclined ('gadget fans').
So, for example people who:

- shop online because they have eclectic tastes difficult to satisfy on the high street or because it is more convenient for their busy lives;
- have a wireless network at home so their children can have computers in their rooms;
- use web-cams to communicate with family and friends overseas;
- use the camera part of camera phones for more than occasional 'snaps';
- use email beyond work contexts;
- have used a digital camera or broadband much earlier than most.

2. People in the process of creating significant personal memories – memories that they will want to document for the future. The obvious candidates would be people with young children, whose early lives they want to remember. Other candidates could be people who are distant from their families. They may rely on mementos (souvenirs, photographs, letters) to compensate for the lack of time spent physically 'living alongside' their families.

3. Imaginative and open-minded people; people who are open to new ideas, more likely question and develop their own ways of living rather than conforming to 'traditional' expectations.
For example, clues could be taken from:

- Home décor – have they chosen seating for their living room based on their specific needs (e.g. a comfy old sofa and a rocking chair to nurse the children in) rather than a traditional matching three piece suite?
- Clothes shopping habits –second-hand bargains twinned with designer items rather than everything from Next and M&S;
- What car they drive – fitness for purpose as opposed to fashion or trends;
- People that have moved around geographically or changed job frequently;
- People who home educate their children.
- People who 'build their own' holidays – finding own hotels, flights etc. rather than booking package holidays.

Appendix B Engagement type tallies

Digital Mementos

		txt globe		aroma-mouse		mem-eggs	
Useful?	**Engagement type:**	**filtered**	**unfiltered**	**filtered**	**unfiltered**	**filtered**	**unfiltered**
No	Dismissive	1	2	1	6	0	1
No	Superficial/oblique	2	4	2	3	2	3
Neutral	Off topic			0	0	0	5
Neutral	Concept clarifications						
Yes	Conceptual/experiential	10	9	7	5	7	7
Yes	Constructive	1	0	1	0	1	0
Yes	Self-critical	2	4	0	0	0	0
Yes	Affective	1	1	1	1	0	0
Yes	Imaginative	2	0	4	0	5	1
Yes	Related topic			2	1	0	0
	discussion time:	09:30	17:00	07:00	09:00	07:10	09:55

Continued:

		once upon a web		Totals		Engagements/minute	
Useful?	**Engagement type:**	**filtered**	**unfiltered**	**filtered**	**unfiltered**	**filtered**	**unfiltered**
No	Dismissive	1	3	3	12	0.11	0.24
No	Superficial/oblique	1	3	7	13	0.25	0.26
Neutral	Off topic	0	6	0	11	0.00	0.22
Neutral	Concept clarifications			0	0	0.00	0.00
Yes	Conceptual/experiential	3	4	27	25	0.96	0.50
Yes	Constructive	0	0	3	0	0.11	0.00
Yes	Self-critical	0	0	2	4	0.07	0.08
Yes	Affective	2	1	4	3	0.14	0.06
Yes	Imaginative	2	1	13	2	0.46	0.04
Yes	Related topic	0	1	2	2	0.07	0.04
	discussion time:	04:00	13:47	27:40	49:42		

Appendix C Conceptual Designs Presentations

The enclosed CD-ROM contains the conceptual designs devised in the *Living Rooms* and *Digital Mementos* projects, specifically:

- digitalMementosOutputs.ppt – the 'opportunities for design' themes and product concepts that formed the outputs of *Digital Mementos*;
- digitalMementosConceptualDesigns.ppt – the conceptual designs I devised and presented in workshops 2 and 3 of *Digital Mementos*; and
- livingRoomsConceptualDesigns.ppt – the conceptual designs I co-devised and presented in workshops 2 and 3 of *Living Rooms*.

In these presentations, slides' notes fields contain short descriptions to support the images used.

Appendix D *Digital Mementos* flow diagram

This appendix presents the flow diagram I produced of my experiences, as a designer, in the *Digital Mementos* project. The diagram shows the progression of my thinking about the design project (my 'design thinking') from left to right with time, as developed and expressed in conceptual designs (shown as 3-D boxes) and affected by stakeholders' discussions (shown as speech boxes).

Along the diagram, following each workshop, the main themes/ideas in my design thinking are shown (shown as ellipses). These are 'shorthand' summaries for themes and ideas I developed in my notes and sketches and a fuller description of them, with quotes from the workshop transcripts, is provided following the flow diagram.

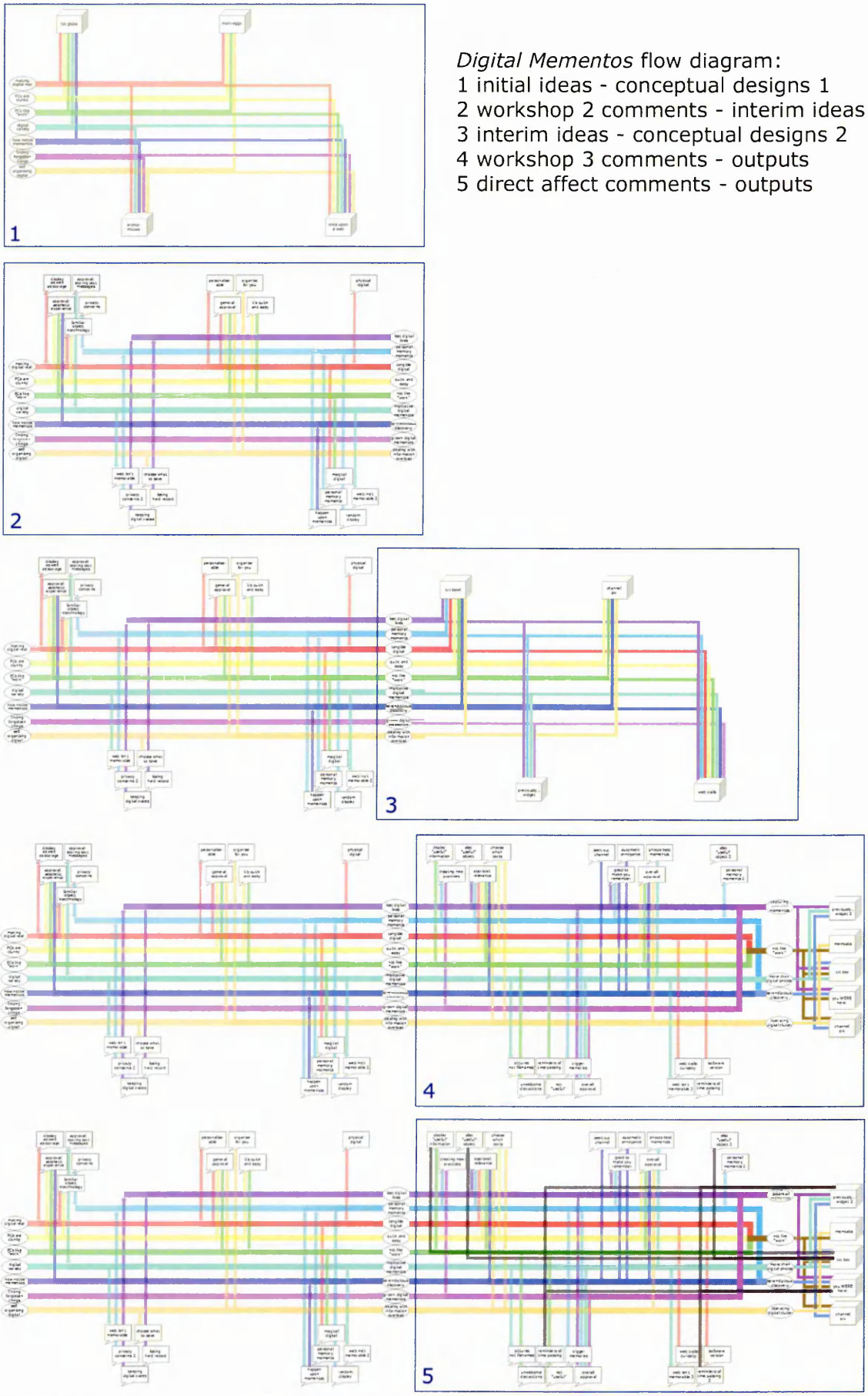
I originally created the diagram in Adobe Photoshop using layers: a layer showing which themes/ideas are developed in and expressed through which conceptual designs; and a layer showing how stakeholders' comments affected my design thinking. However, for simplicity and clarity I have split the diagram into five diagrams that show portions of the whole diagram over time: in Figure D.1 how the initial ideas relate to the first conceptual designs; in Figure D.2 how stakeholders' comments in workshop 2 affected my thinking; in Figure D.3 how the interim ideas relate to the second conceptual designs; in Figure D.4 how stakeholders' comments in workshop 3 affected the output themes and conceptual designs; and in Figure D.5 the direct affects of certain stakeholder comments on the final output conceptual designs. Firstly, Figure D.0 illustrates how these sub-flow diagrams relate to each other.

The affect of stakeholders' comments on my design thinking is illustrated in several ways according to whether they strengthened my ideas/themes, weakened them, modified them or inspired new ideas/themes. These affects are also illustrated as being direct (where a comment explicitly relates to an idea/theme) or indirect (where a comment does not relate explicitly to an idea/theme but provides an implicit insight in relation to it). Thus:

- Arrows on the coloured lines stemming from comments indicate direct affects and no arrows indirect affects;
- Strengthening/weakening is illustrated by an increase/decrease in the colour density of the idea/theme lines;
- Modifications are shown by new ideas/themes in ellipses and combination of idea/theme lines;

- New ideas/themes are shown as new ellipses and lines.

Some design refinements suggested in the final workshop discussion did have some effect of the final conceptual designs that I developed as the project's outputs. I illustrated these effects as grey lines on a third layer of my original flow diagram, but they are now overlaid on Figure D.5, again with increasing densities and arrows as discussed in relation to the affect lines above.



Digital Mementos flow diagram:
1 initial ideas - conceptual designs 1
2 workshop 2 comments - interim ideas
3 interim ideas - conceptual designs 2
4 workshop 3 comments - outputs
5 direct affect comments - outputs

Figure D.0 a flow diagram of how the *Digital Mementos* results were produced (key)

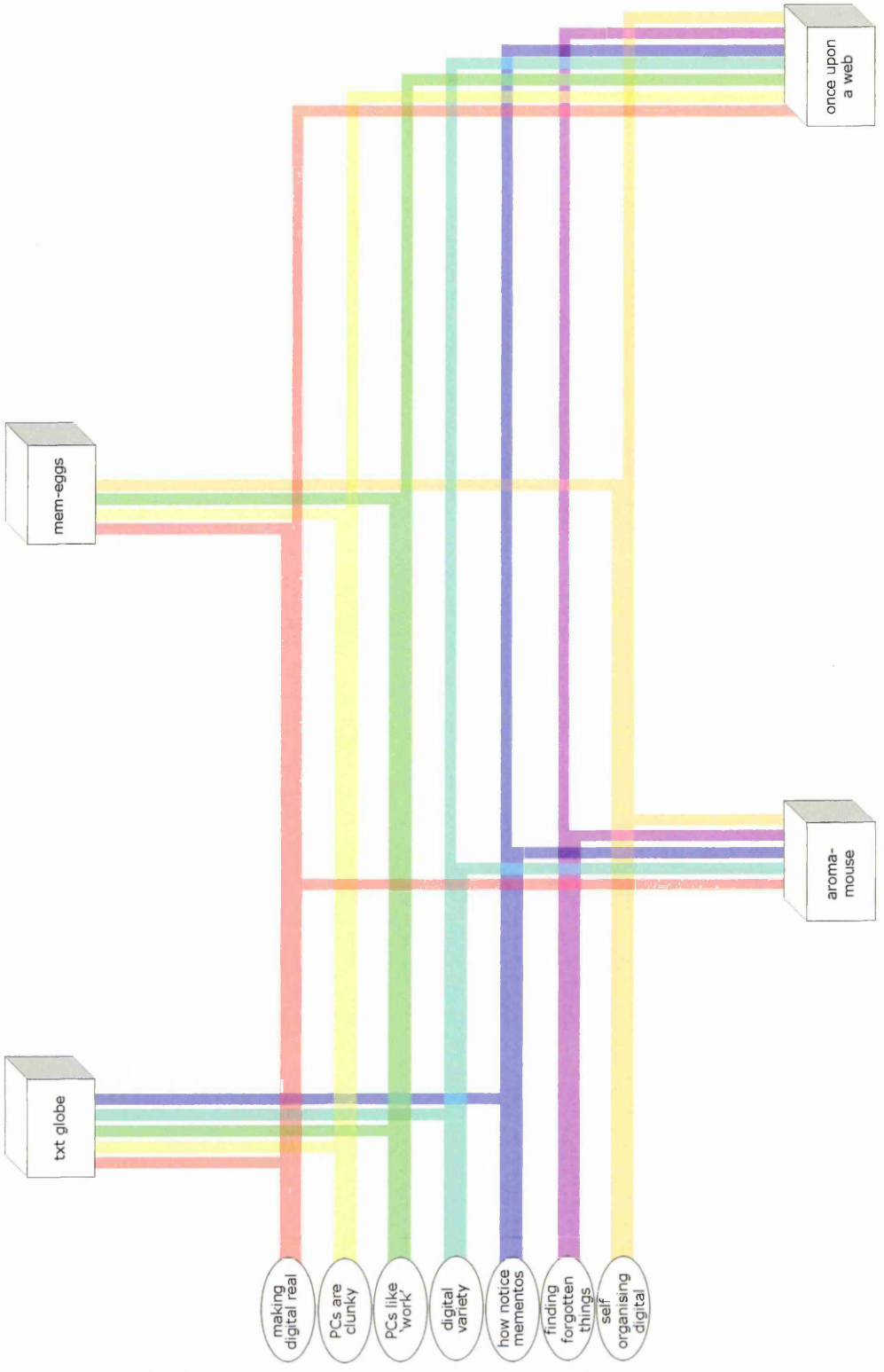


Figure D.1 how the Digital Mementos results were produced (sub-flow diagram 1)

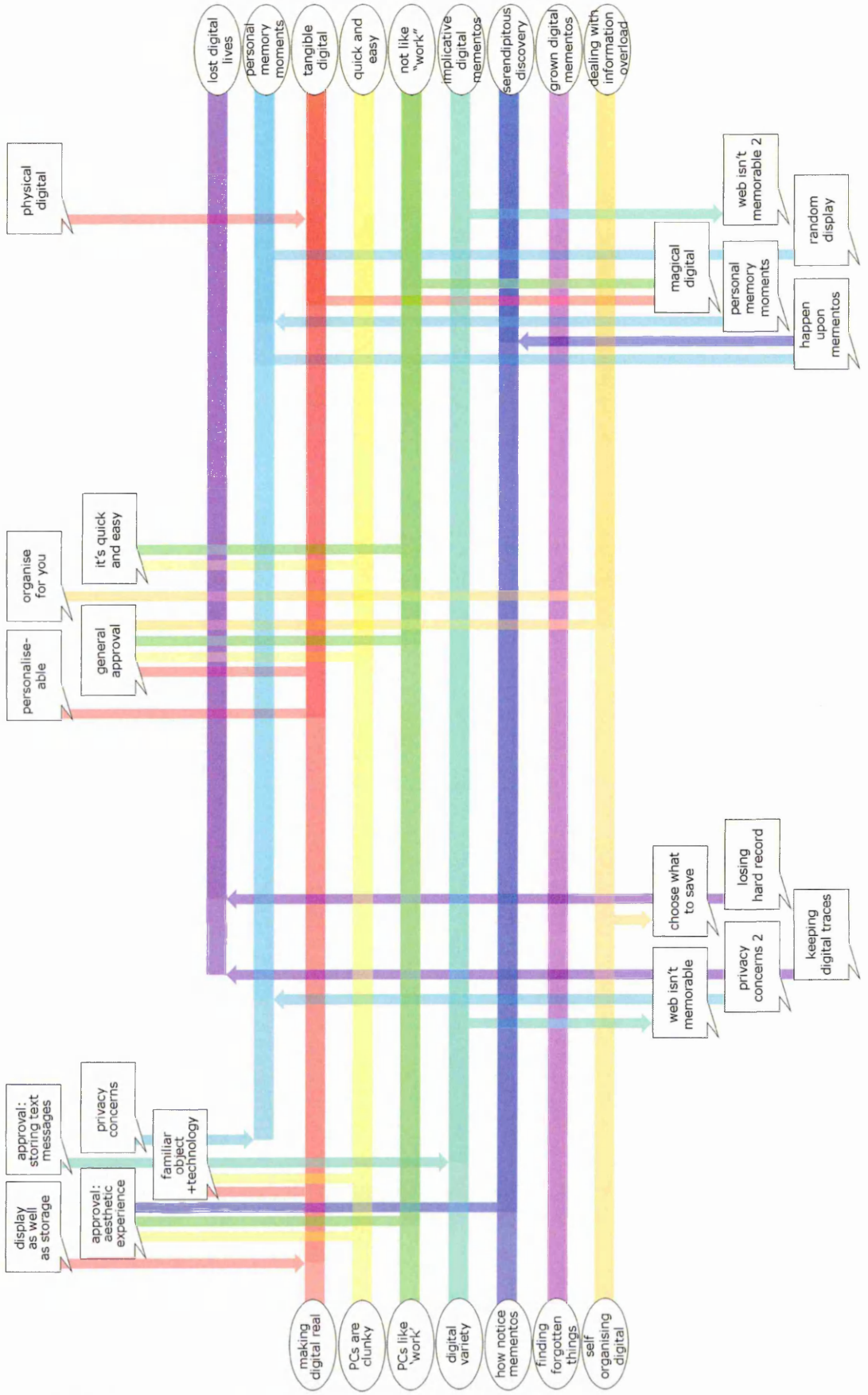


Figure D.2 how the Digital Mementos results were produced (sub-flow diagram 2)

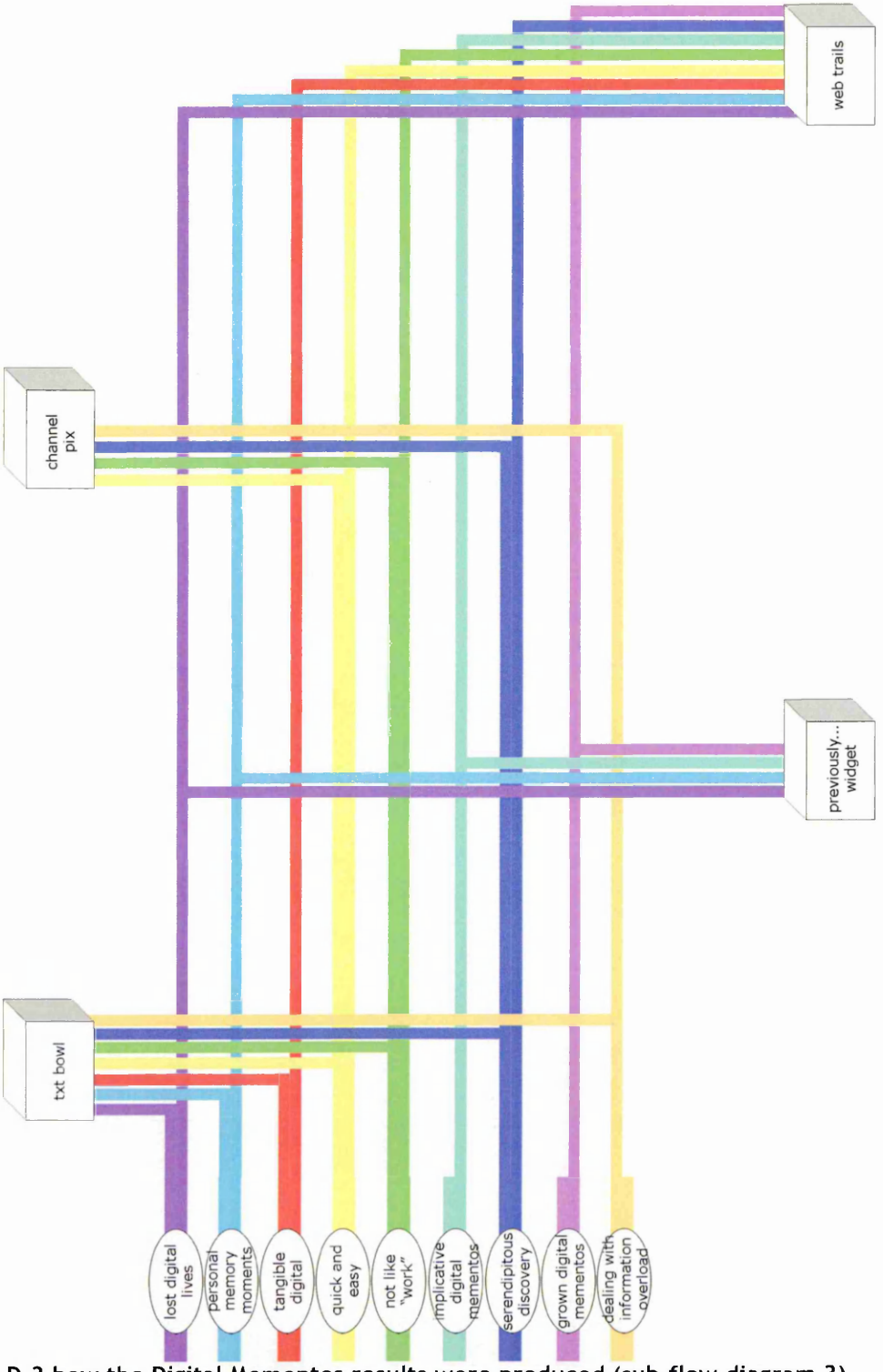


Figure D.3 how the Digital Mementos results were produced (sub-flow diagram 3)

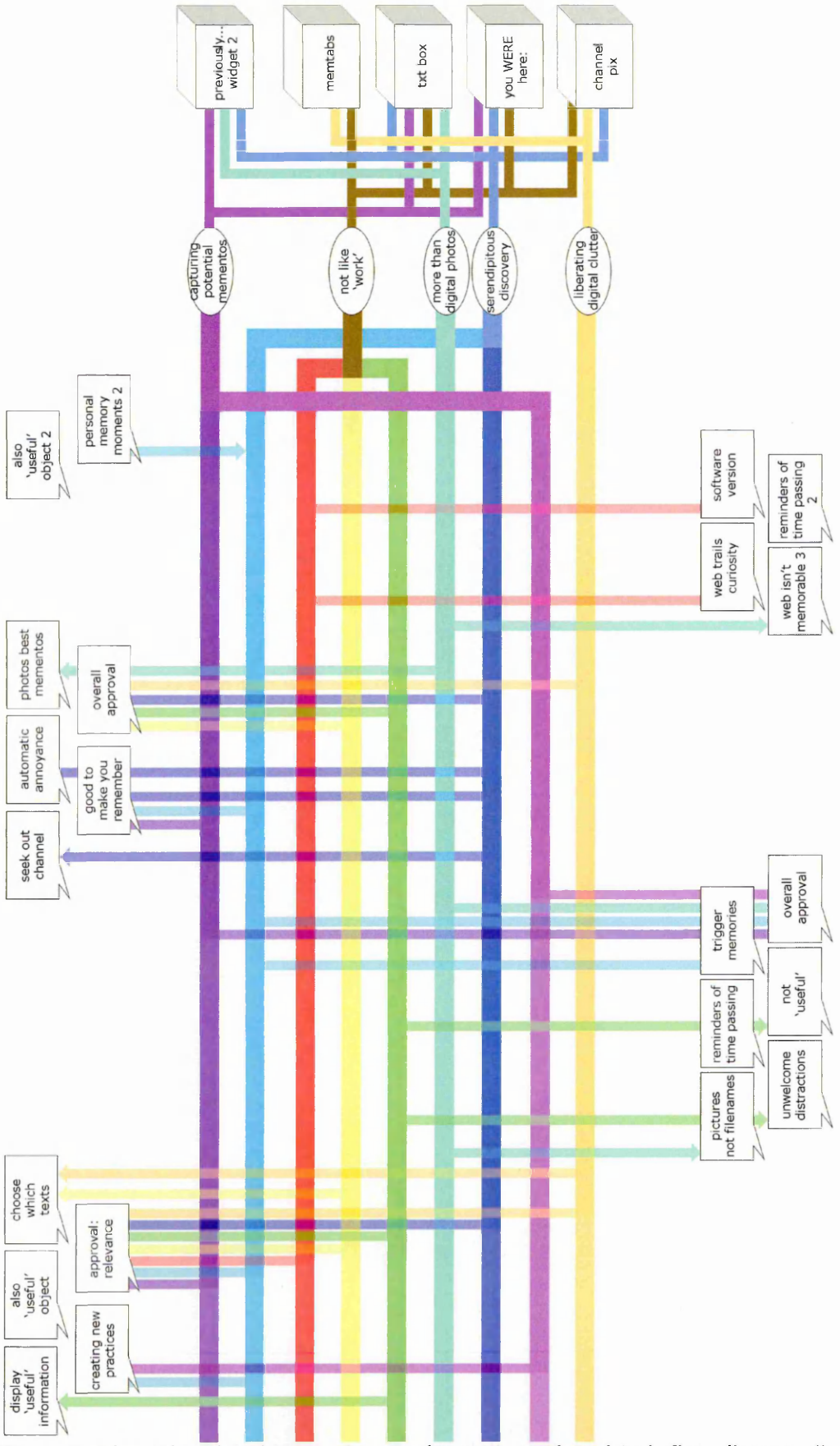


Figure D.4 how the Digital Mementos results were produced (sub-flow diagram 4)

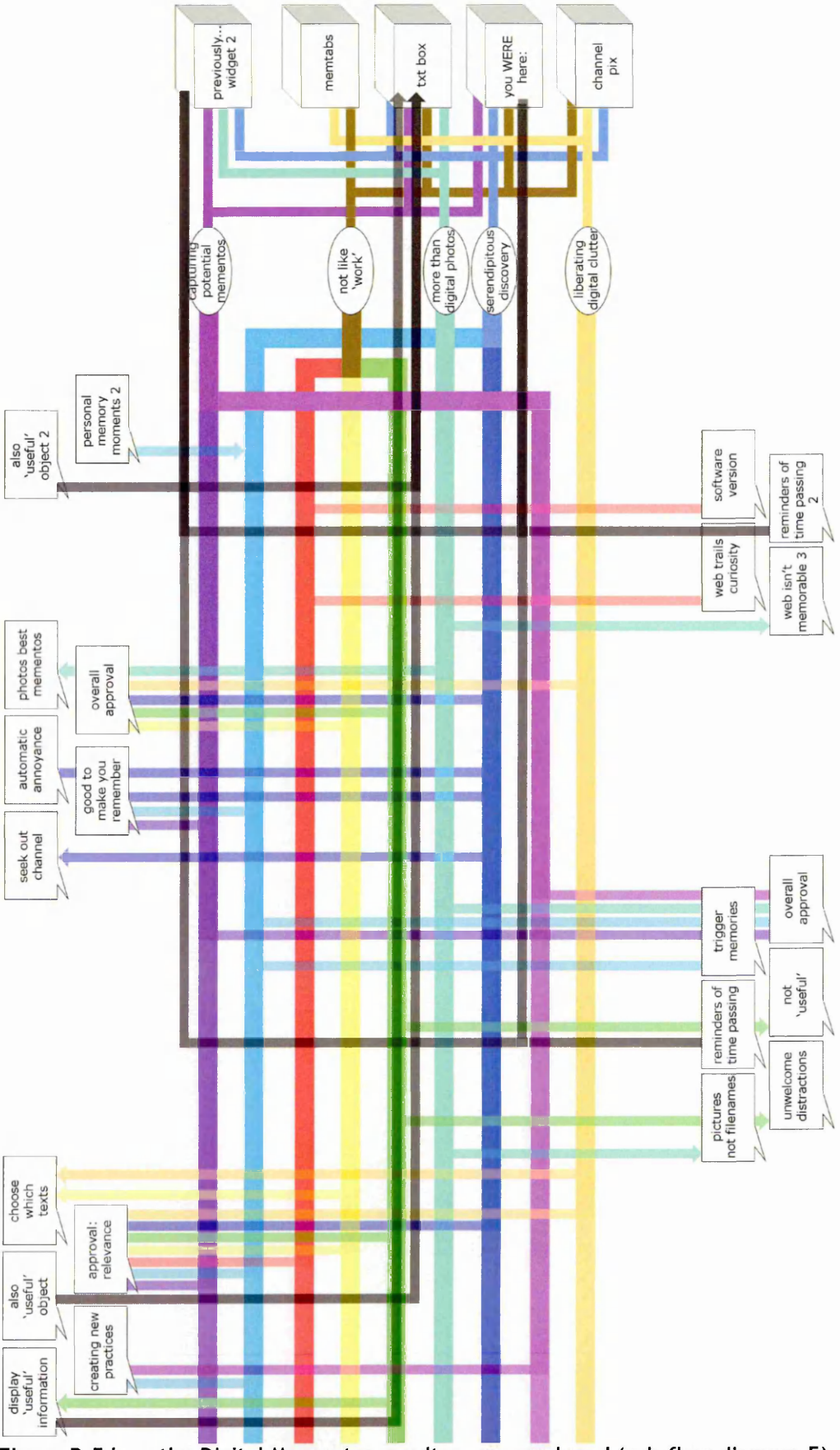


Figure D.5 how the Digital Mementos results were produced (sub-flow diagram 5)

Flow diagram key

This key gives a fuller description of the ideas/themes at each stage of the flow diagram (initial themes, intermediate themes) and expands the summarised stakeholder comments (in speech boxes) by providing illustrative excerpts from the workshop transcripts.

Where possible, an indication of a theme or comment's source is given following each description. For themes, this is where the ideas were noted (such as in a sketchbook) together with their date of creation – although certain themes were not explicitly noted and were instead implicit in the development of the concepts. For comments, this is an attribution to the participant who made the comment – anonymised to P1, P2 etc.

Initial themes

These themes express my ideas (as informed by the first workshop and contextual review) prior to devising the first set of conceptual designs. They were my 'hunches' (not explicit statements of fact) that informed the design of provocations and possibilities for 'how things *could* be'.

Making digital 'real'

Digital media is often perceived as 'unreal' and vulnerable/impermanent. Physical objects are perceived as 'real', permanent. Digital media is also dispersed and consequently less tangible.
(Sketchbook notes 15/2/2008)

PCs are clunky

PCs are 'clunky' – they take time to boot up, search for something, run programmes, show files. Physical artefacts are immediate, 'to hand' and easily manipulable.
(Sketchbook notes 15/2/2008)

PCs like 'work'

PCs seem to inherit the connotations of 'work' – organisation in files and folders, a focus on performing distinct 'tasks' etc. This seems different to other personal practices that are more creative, informal and free flowing – 'fuzzy' rather than ordered.

(Sketchbook notes 15/2/2008)

How notice mementos

What makes us notice mementos? I.e. attend to them and, consequently, reminisce.
(Sketchbook notes 15/2/2008)

Digital Variety

The digital in digital mementos can refer to many things beyond digital photographs, such as text messages, voicemail, PowerPoint presentations etc.
(Sketchbook notes 15/2/2008)

Finding forgotten things

Objects can be forgotten, get 'pushed to the back of the drawer'. When they are re-discovered they can prompt reminiscence.
(Sketchbook notes 19/3/2008)

Self organising digital

We are overwhelmed by digital data – 'information overload'. But digital information and software could alleviate this problem – 'self-sorting' software and using META data to assist this.

Workshop 2 comments

Display as well as storage

"it's an object of art and decoration rather than a storage device" (P1)
"not just a storage device, but as that kind of reminder of events when you can just flick that over and 'oh yeah I remember' " (P2)

Approval: aesthetic experience

"I really like the idea actually. I'm not sure it would do me any good, but it would be quite a funky thing to have on the mantelpiece" (P3)
"I actually really like [the aesthetics of the object] I think it's a great idea" (P4)

Approval: storing text messages

"I actually quite like the idea, not necessarily the snow storm idea", "I quite like the idea of just somewhere that I can actually send my texts to" (P2)

Familiar object + technology

"I like the idea as well that it's a familiar object that people know, these snowstorms but you're just adding a bit of technology into it, I think that's a good approach" (P5)

Privacy concerns

"text messages [..] can contain really personal content and I'm not sure I'd want to display something [..] to be displayed for whoever was coming in" (P1 and ensuing conversation)

Web isn't memorable

"the websites that I visit every day are the ones that are more meaningless to me over a long period of time but the ones you go to fewer times" (P3)

Choose what to save

"a really wonderful idea if there was some kind of signal you could click, to, like it would just record your favourites or something, rather than just everything you viewed" (P4)

Privacy concerns 2

"this can become a spying device" (P6).

Losing hard record

"with digital that you are losing some of that.. like a hard record of what you've seen..", "it reminds me of going to my Mum's and going in her loft and you see all your old school books and things which maybe you wouldn't be able to do now.." (P3)

Keeping digital traces

"with [..] booking significant things I've got all the emails [..] from things years gone by that I've just kept almost like as a digital memory" (P5)

General approval

"I like the idea", "I really like the idea", "it's the best one yet" (various)

Organise for you

Implicit – "that would be really helpful because, er, especially the example you used where your mind isn't into record mode" (P1)
"it's the way of automatically filing them" (P5)

It's quick and easy

(Implicit in conversation)

Personalise-able

"people actually have their own kind of tag almost their mem-eggs and it becomes almost like an art thing as well" (P2)

Magical Digital

"I love the idea of that, I think part of that is my favourite one so far because there's something quite magical about it having a hardback book on a bookshelf that's slowly glowing" (P4)

Web isn't memorable 2

"I find [web] forms a bit uninspiring" (P4)

Happen upon mementos

"I keep photographs all over the house and once in a while I walk past and think 'oh I haven't looked at those for a while' and I take them out and look at them, I love that.. this would give me a chance to do that digitally", "the mouse as well actually, the more I think about the mouse the more I think actually I would probably if I had one, I probably would use it" "[Question: there's something about the serendipitous element?] exactly" (P1)

Random display

"just totally random, and you just think 'oh yeah', but it's a bit pointless but quite nice, quite human", "but yeah like the idea of.. I like the randomness of it.." (P1)

Personal memory moments

"it's just a nice little personal moment that you can think about your past.. but like I do find I think it's quite pointless in one sense but then art Doesn't always have to have like a deeper meaning does it? It's just a moment for you to share with your history I suppose.." (P1)

Physical Digital

"I like the physicality of it [*mem-eggs*]" (P2)

Themes for second conceptual designs

During *Digital Mementos* I kept a journal where, together with my sketchbook, I developed my thinking relating to the design of digital mementos. As part of this development I developed the initial themes, expressed in the first conceptual designs, into more detailed descriptions of themes and ideas relating to digital mementos – I used writing to clarify and develop my thinking. The notes for all but the last of these themes are taken from this journal.

Implicative digital mementos

How does the memento artefact connect to the memory/experience it relates to? The artefact might be a direct illustration of the experience such as a photograph, video, or sound recording. Or the artefact might be an implication of the experience. Implication in the sense of "a likely consequence" (Oxford University Press 2002), an artefact that resulted from or has a strong association with the experience, such as travel tickets, restaurant receipts, a set of old keys, a child's milk teeth.

An increasing number of our experiences involve digital technology. We are using computers and other digital devices more often in how we live our lives. Increasingly for non-work related applications – booking a holiday, staying in touch with friends, sharing our photographs. Each of these experiences leaves 'digital traces' – traces of the activities that took place. In the same way that a bus ticket is a physical trace of a journey a booking confirmation email or a visited travel web page could be digital traces of a holiday.

Digital mementos could be digital traces. The digital trace is an implication of the experience it relates to. It prompts recollection of the activity it is a remnant of and therefore the associated memory/experience. For example the trace of having edited a spreadsheet on a particular date reminds me of planning my wedding, and, by inference, the wedding day itself. Certain digital files could also function in this respect. The spreadsheet itself in the example above is an implication of planning my wedding.
(project journal, 5/2008)

Grown digital mementos

How does an object become a memento? How does it get its 'memento-ness' – its capacity to prompt recollection of memories? An object can become a memento by deliberate intent or it can 'grow' into a memento. For example a souvenir key ring is a deliberate memento whereas a set of old keys 'grows' into being a memento. Intentionally selected mementos, by default, deliberately prompt recollection of memories – the artefacts we selected for this purpose. Unselected objects may become mementos later. With digital technology two other options are possible: random selection of digital artefacts and keeping a defined set of digital artefacts. These latter options do not really select mementos as select *potential* mementos – artefacts that may 'grow' into mementos later.
(project journal, 5/2008)

Serendipitous discovery

A memento can be found and then used in several ways: it might be deliberately sought out – looking for the photo album to show friends; it might be something that one 'happens upon', serendipitous discovery – finding an old souvenir at the back of a drawer whilst searching for something else; and digital technology might offer a third form: random discovery – a memento that reveals itself at a random time, on a computer or a digital device that attracts attention to itself (via light, sound, vibration etc.).
(project journal, 5/2008)

Lost digital lives

As we live more of our lives digitally (using digital technology to manage our everyday lives and having digital technology as part of our significant

experiences) there is a danger that we will lose some of the artefacts that help us remember things. Previously, physical remnants remained of our activities to remind us (bus tickets, souvenirs) that were an intrinsic part of those experiences. Unless we make a conscious effort to save the digital traces we create, they will be lost along with the opportunity to use them as future mementos.
(project journal, 5/2008)

Tangible digital

In some ways digital information is 'hidden'. A PC 'hides' the digital photographs (or emails, documents, videos etc.) that are stored on its hard disks, particularly when it is turned off. Certainly this digital information can be retrieved and viewed, but is not immediate in the sense that a framed photograph or printed book is. What ways are there of making digital information more tangible and immediate?
(project journal, 5/2008)

Dealing with info overload

We're taking an increasing number of digital photographs, sending and receiving more emails, using the web more often and organising more of our lives using digital technology. This is creating vast quantities of information that we can feel overwhelmed by, and feel obliged to organise in some way. More digital data is more clutter and more stress. But digital technology offers possibilities of sorting, storing and managing this data automatically in a 'smarter' fashion. What applications could be developed to reduce our anxiety and feelings of 'information overload'?
(project journal, 5/2008)

Not like work

Accessing and managing digital information often has the connotation of 'work'. It involves organising 'files' in 'folders' on a computer – thinking logically, executing commands, following procedures. Even if the computer is in your living room rather than in the home office or study, the practice is the same. Using physical mementos isn't like work, so why should using digital mementos have work connotations? What interactions with digital mementos could be developed that are more informal and relaxed?

(project journal, 5/2008)

Quick and easy

Compared to their non-digital equivalents, accessing mementos on personal computers is slow and 'clunky'. A keepsake on a shelf is immediate; it takes seconds to flick through a photo album. In contrast irrespective of the processor speed in a personal computer, it is still necessary to wait for it to boot up, navigate to the appropriate file/folder, start the correct application and then open the correct file. Several tasks with waiting in between, physical mementos are 'just there'. How can digital mementos be 'just there' or at least quick and easy to access?
(project journal, 5/2008)

Personal memory moments

Remembering a past event is a highly personal (and, often, individual) activity. Mementos create such 'personal memory moments' that provide a pleasant and rewarding brief distraction from more mundane everyday practices.
(This theme relates directly to the workshop comment that inspired it).

Workshop 3 comments

Display 'useful' information

"if you had a calendar on your phone, where you've got things to do in the future and something comes up on the day, you've got your phone in there, and you can see some of your tasks coming out" (P5)
"a to do list" (P1)
"that would probably kill it for me if it was just sort of archived texts" (P5)

Also 'useful' object

"Yeah you see I'd find that useful, and it would be somewhere to put my keys. Double whammy." (P1)

Choose which texts

"the idea of that not having any kind of control mechanism, so anything over six months was fair game for it to flout and throw up. I'd be a little wary of",

"maybe you can set it so that it only picks certain ones up, that you could actually keep others private." (P2)

Creating new practices

"That's kind of like possibly instigating a new level of the use of technology, because if I knew someone was having a way of displaying a nice text message, I'd be more tempted to send a text message that wasn't just spelt with like as few vowels as possible" (P1)

Approval: relevance

"Yeah you see I'd find that useful, and it would be somewhere to put my keys. Double whammy." (P1)

Pictures not filenames

"it'd be good as a screensaver wouldn't it? When your screensaver comes on, you get pictures of what you were doing" (P3)

Reminders of time passing

"just that little thing, something to trigger you 'was that a year ago?' or 'is that only a year?' ", "I'm always a sucker for those lists, y'know five years ago this was top of the charts or this was on TV, that sort of thing, it's kind of a nice little thing to show you just maybe how kind of history's just changed over time, gradually" (P2)
"it would totally take me back to what I was doing a year ago [..] I would love it" (P1)

Trigger Memories

"that'd be good to trigger sort of memories" (P5)

Unwelcome distractions

"I would like it, but only if it was maybe at startup time, because I work from home, so my home computer is my work computer. I would get really annoyed if that came up when I was trying to concentrate" (P1)

Not 'useful'

"it's not something That's lacking on my machine at the moment, if you know what I mean" (P5)

Overall approval

"I quite like that idea" (P2)
"like word of the day, that I have a quick look and then.. move on. Yeah so I would love that" (P1)

Seek out channel

"more pro-actively selecting [..] if it was a channel" (P3)
"that would be how I would want it to work actually, just another channel to watch" (P2)

Automatic annoyance

"I think I might find it a bit intrusive, if it just came up. If I was genuinely just looking, channel surfing then and it came up I might find that a bit annoying actually" (P3)

Photos best mementos

"the main sort of digital memories that I've got, and perhaps most people have got, it's not sort of snapshots of all the documents I've been working on or text messages or whatever it usually is photographs" (P5)

Good to make you remember

"I like the fact that it almost encourages you, saying you're wasting time, do something productive here's something important to look at", "it makes it much more accessible" (P2)

Overall approval

"I like it. It's a good way of being able to see your store of digital photographs without really having to do anything" (P5)
"I think if we had that we'd look at it quite a lot actually" (P3)
"I love it." (P1)

Web Trails Curiosity

"it'd be interesting to see a trail of me surfing the internet" (P3)
"it would be quite interesting to see" (P2)
"I'd be intrigued to see how the trail looks" (P5)

Software version

"just some software on your PC" (P5)

Web isn't memorable 3

"I don't know if you'd buy one for the one time a year that I'm booking a holiday or something like that" (P5)
"photos still captures the essence of what you're looking at though doesn't it?" (P3)

Reminders of time passing 2

"it'd be just to go back [..] and look at a year ago, what the news was a year ago", "I would find that really interesting personally.. but y'know I'm quite interested in the news. But also see how technologies have evolved, so if you went back to the BBC news website ten years ago I bet it looks completely different to how it does now" (P3)

Personal memory moments 2

"it would give me two minutes of smiles in the day and that's a really nice thing" (P1)

Also 'useful' object 2

"normally I don't like gadgets and gizmos but it has such a practical element.. I just like the idea that it's a piece of furniture almost that you can use on a totally non-technical practical level, somewhere to always put your phone and keys" (P1)

Output Themes

These themes (capturing potential mementos, not like 'work', more than digital photos, serendipitous discovery, and liberating digital clutter) form part of the

output of *Digital Mementos* and are described in the relevant PowerPoint file on the Appendix C CD-ROM.