Getting it Right: Lessons Learned in Applying a Critical Artefact Approach

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Undisciplined! Proceedings of the Design Research Society Conference 2008.
Sheffield, UK. July 2008

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Lessons Learned in Applying a Critical Artefact Approach

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Abstract

"Critical artefacts", the products of critical design (Dunne 1999), prompt reflection rather than satisfy obvious user needs. The author is developing an instrumental use of critical artefacts as part of a human-centred design process. Earlier work showed the effectiveness of this approach in allowing stakeholders to engage with novel product ideas. This paper describes a project, Living Rooms, developing the approach with a broader group of stakeholders and devising the critical artefacts with other designers. Although providing insights into the design context (Bowen & Chamberlain 2008), this application of the approach was less productive than in earlier projects and suggested factors that could affect its efficacy. Implications for future applications of the approach are noted: the type of contexts it is appropriate for; the characteristics of effective stakeholder participants and the need to educate them in the context and enable them to think imaginatively.

Von Hippel's 'lead users' (1986, 1988) could provide a framework for selecting stakeholders likely to engage effectively with critical artefacts. The second part of the paper summarises lead user theory and discusses how the two characteristics of lead users, motivation and capability (Luthje & Herstatt 2004), tend to make them suitable participants for the critical artefact approach. A second project, Digital Mementos, is described – in particular how lead-user-based selection and the above implications have been applied.

The paper concludes by reviewing the progress in developing generalisable methods exploiting the critical artefact approach, noting the need to position the approach within wider design activity and points toward future work relating it to the entire product design process.

Keywords

Critical Design; Human-Centred Design; Innovation; Design Methodology

Critical Design and Critical Artefacts

In recent years a 'critical design' movement has developed (Dunne 1999, Dunne & Raby 2001, Janssens 2006, Pullin 2007, Z33 2007). Critical artefacts, as I have termed the products of critical design (2007), could be seen to differ from the products of "non-critical" design in two ways. Firstly, although they are the end products of a design process (i.e. not prototypes mid-process), they are not designed with manufacture and sale as their main objective. They are not explicitly intended as products to be bought, and are often disseminated via gallery exhibition or publication. Secondly they are not intended as practical solutions to obvious user needs rather they prompt reflection by their audience (they may confound or provoke); reflection on

the assumptions underlying the conceptualisation of their contexts, the manner of their design, and the social scenarios suggested by their use. What are appropriate wants/needs, social behaviours and roles for designed artefacts? And what values and ideologies are inherent within them? Akin to art objects, critical artefacts ask questions rather than offer answers.

Fig 1. *Mr Germy* a 'fictional product' by Human Beans 2001

For example *Mr Germy* (figure 1), a critical artefact produced by the Human Beans partnership of two London design professionals (2006), is a teething toy impregnated with bacteria so that babies chewing it improve their immune system by developing resistance to the subsequently exposed bacteria. Human Beans don't expect anyone to wish to buy this product[1], but it does prompt consideration of the conflict between promoting children's health and hygiene, and the acceptable roles for products within this (a product that makes a child a little sick to make her healthier overall?).

For the past five years, my research has focussed on developing a use of critical artefacts within human-centred design[2]. The reflection afforded by critical artefacts is often the desired outcome of critical design. However in my approach I am developing a more instrumental use of this reflection. The approach is focussed on the context (social and physical) for which products are to be designed (the "design context"). Critical reflection is used as a tool for engaging with the design context's stakeholders and developing the designer's understanding of that context. Related 'critical design practices'

[1] In fact another of Human Beans' critical artefacts, Power Pizza (a laptop case developed from a cardboard pizza box), aroused such interest that it was later developed and sold as a limited production run. However it is important to note that this was an unplanned consequence rather than a deliberate intention.

[2] Human-centred design referring to an evolution of user-centred design: designing for a wider set of stakeholders rather than a product's users alone; and designing to advance human dignity rather than designing usable/desirable products without questioning their functions and roles (Buchanan 2001).

and the relationship of my research to them are discussed elsewhere (Bowen 2007).

In earlier work critical artefacts offered a more effective way of developing insights into a design context than direct questioning strategies such as interviews, questionnaires and so-called low fidelity prototyping (ibid). Stakeholders' responses to direct questioning strategies tended to be limited by their current experiences and they had difficulty engaging usefully with novel product ideas. However when critical artefacts were presented for stakeholders' evaluation, the ensuing discussions usefully informed the understanding of the designer participating in those discussions.

For example during a recent study I wanted to explore how the design of living environments could afford social interaction, given that social interaction is an effective counter to the isolation, depression and loneliness that many older people face. However it was felt that direct questioning would have limited success in unpicking this complex issue. I therefore created the *CommuniTools* critical artefact to enable stakeholders to explore the issue.

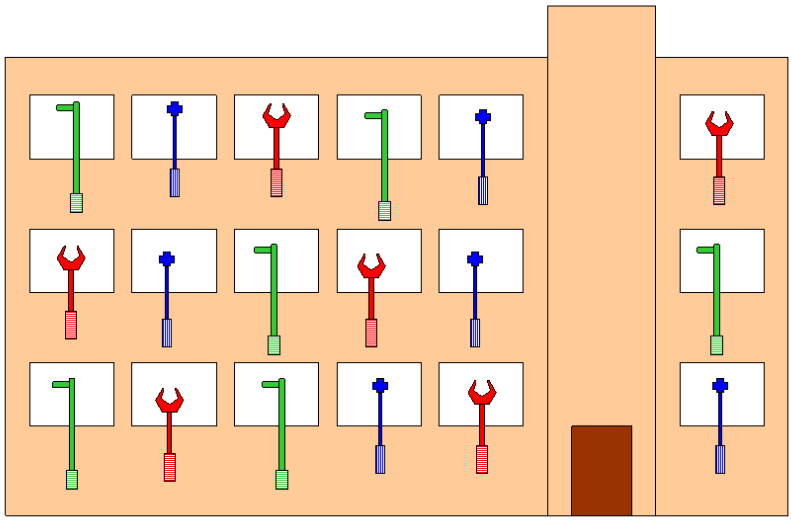

Fig 2. an image from the *CommuniTools* presentation

CommuniTools (figure 2) describes a block of apartments with ceiling lights that require three different tools to lower, open, and remove the light bulb within them. However these tools are distributed amongst the block such that each apartment only has one tool, so residents must visit at least two neighbours in order to change a light bulb. This critical artefact prompted reflection on the value of social interaction, the conflict between personal independence and community dependence and the role of designed artefacts in forcing social practices. In particular the ensuing discussions suggested that although design for social interaction was beneficial, it should be done "by subterfuge" such that stakeholders would not feel overly manipulated by their environments.

The approach I have developed entails having a "dialogue" with groups of stakeholders via series of discussion workshops. In the first workshop the stakeholder group "talks" to the designers by sharing their experiences centred on artefacts they have chosen associated with the design context.

The designers then "reply" via series of artefacts expressing their ideas and understanding. These artefacts prompt further discussion and inform the thinking of the designers and consequently the development of further artefacts. In the second workshop these would be critical artefacts, aiming to prompt stakeholders' reflection of wider issues and underlying values and assumptions inherent in the design context. The artefacts presented in third and any later workshops would attempt to be more relevant to the designers' understanding of stakeholders needs. The principle being that the critical artefacts enable the designers to gain an understanding of the design context that then enables them to develop product ideas relevant to stakeholder needs. Stakeholders' responses to further artefacts evidence this relevance and further inform the designers' understanding and development of more relevant artefacts.

Rust has shown how designers' ability to synthesise new worlds can open up new areas for research (2004). In my critical artefact approach the designer participates in the discussion workshops in order to inform their design of further artefacts. The aim is not to produce an explicit understanding of the context, which then forms an input to design activity (such as a design specification), as social scientists might expect to do. Rather that the act of designing is itself the way in which understanding is developed and the designed artefacts then embody this understanding.

Although the effectiveness of this critical artefact approach had been demonstrated with smaller projects with the author as the participating designer, there remained work to be done in developing generalisable methods to exploit the principle. In particular working with broader groups of stakeholders and involving other designers in the process. The remainder of this paper discusses a project in which this took place with the resulting implications for the development of the critical artefact approach and an in-progress project where these implications are now being tested.

Case Study: Living Rooms

Background

The proportional population of older people in developed nations is increasing (US Census Bureau 2007) and this demographic change raises questions on how the health and wellbeing of older people can be supported in future (Ladyman, 2005). In response to this, the effects of ageing throughout the life course is a key research interest of Lab4Living a recent collaboration between the Art & Design and Health & Social Care research centres at Sheffield Hallam University. A key aspect of Lab4Living's work is the involvement of stakeholders in design activity, developing and applying methods of human-centred design (Buchanan 2001).

The Living Rooms project was an 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 12-month project was funded by the UK Strategic Promotion of Ageing Research Capacity (SPARC) and aimed to directly inform the ongoing work of Lab4Living in two ways: as an early investigation of the context: the design of the home for "tomorrow's

older people" (these results are reported elsewhere (Bowen & Chamberlain 2008)); and as an investigation into methods of engaging with stakeholders. This would then inform the development of a set of methods, resources and environments for involving stakeholders in future projects in an effective manner.

The project was led by Professor Paul Chamberlain with the author responsible for designing and managing the activities stakeholders would participate in. We selected my critical artefact approach as the basis for these activities as it furthered our joint research interest in the use of artefacts in engaging stakeholders (Chamberlain & Bowen 2006) and provided an opportunity to further develop and evidence my approach.

Project Details

34 people participated in the project from Sheffield, chosen to represent four broad categories of stakeholders: "future old", "active old", "frail old"[3] and 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 videotaped 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 artefacts. Four other designers assisted in devising the artefacts but did not participate in the workshops – two MA and two PhD design students at Sheffield Hallam University. A colleague from the Centre for Health & Social Care Research assisted with recruiting the stakeholder groups and sat in on four workshops as an observer.

Implementing the Critical Artefact Approach

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

[3] 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 "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.

Previously, working as 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. Prompt cards were produced in response to the first workshop insights and contextual review which were then used in a brainstorming session. This session began with the author giving a short presentation outlining the principles of critical design. The brainstorm yielded several ideas which were developed by the MA students and the author, under direction from Chamberlain and me, into a set of critical artefacts from which five were selected for workshop two. A parallel process of developing an understanding of interesting areas for enquiry and developing design ideas that expressed and explored these areas took place. And a narrowing down of these ideas to focus onto what we considered promising lines of enquiry.

The critical artefacts were presented to the stakeholder groups via a projected PowerPoint presentation; attempting to emphasise the experiences and social situations of the critical artefacts' use rather than their specific functional or aesthetic resolution. Narratives of several images were used to "tell the story" of three of the critical artefacts' use. The artefacts and their users were illustrated using abstract CAD renderings or "sketchy" drawings, to avoid focus on their resolution. Each artefact was presented individually and then the stakeholder groups were prompted to share their opinions of them and explore the situations and possibilities they suggested.

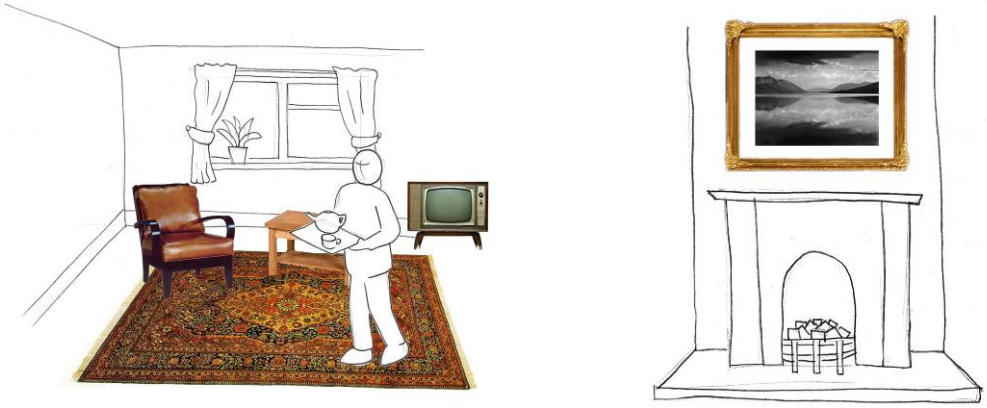

Fig 3. images from the *Ripple Rug* presentation

For example *Ripple Rug* (figure 3) is comprised 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.

Following the second workshop discussions, the artefacts for workshop three were devised in a simpler process: Chamberlain and I reflected on the discussions and developed concepts in response. These concepts 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 artefacts" were not refined versions of the critical artefacts according to stakeholders' comments. Rather

they were new design concepts expressing our new understanding of the design context as informed by the second workshop discussions.

Three revised artefacts were presented in the third workshops and a deliberate effort was made to present more personalised, specific scenarios for their use. This entailed providing more details in the narratives using staged photographs of real people and more developed fictional characters interacting with the artefacts. A PowerPoint presentation was again used, and one of the MA designers was involved in producing physical models of two of the artefacts.

Fig 4. images from the *Glow Gems* presentation

For example *Glow Gems* (figure 4) 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). 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.

Findings and Implications

As noted previously, I have reported the design context findings elsewhere (2008). This paper will instead concentrate on the findings relating to the effectiveness of the critical artefact approach.

The implementation in the Living Rooms project enabled Chamberlain and me, as designers, to develop a greater understanding of the context. This was expressed in the form of revised artefacts that the stakeholder groups recognised as relevant to their needs and in the identification of key themes for future enquiry via the development of further artefacts. 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 (more in ibid). However earlier implementations of the critical artefact approach were more effective in producing insights (Bowen 2007). Comparison with these earlier projects may suggest differences that could account for their relative success.

In Living Rooms, my primary concern was that stakeholders were not engaging with the critical artefacts in the desired manner and to a sufficient degree. Namely creative thinking around the situations, experiences, values and needs that the artefacts suggest rather than more mundane aspects of the artefacts' resolution; thinking "outside the box" rather than evaluating appearance, function or cost.

This problem could be caused by several factors. Firstly the critical artefacts may not have sufficient aspects to prompt critical reflection. In Living Rooms this may be because the scenarios suggested by the critical artefacts were too familiar – stakeholders recognised similarities with familiar scenarios associated with the large number of existing products and systems. They tended to offer anecdotes about or evaluate the critical artefacts against existing products, both of which are less desirable in opening up the discussion. This was less of an issue with an earlier project investigating products for displaying and managing digital photographs outside the familiar paradigms of paper prints and computer monitors (ibid). The critical artefact scenarios were radically different to anything suggested by existing products – e.g. a system enabling a mother to display anger at her son by wiping out all photos of him on display. This suggests that the choice of context is significant in the effectiveness of the critical artefact approach.

Secondly the stakeholders 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. The artefacts themselves may have contributed to this – they may not have prompted a wider engagement. This could be because they were too well resolved in form and function (thus lending themselves to evaluation); there may have been too little emphasis on their "experience of use" in their presentation. And they may not have been provocative enough.

Thirdly 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.

Finally we may have been using stakeholders not best suited to this kind of activity - people who do not easily engage in creative thinking and 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. Defining and using the "right kind" of participants may be difficult to achieve.

The findings from Living Rooms therefore had implications for the next implementation of the critical artefact approach:

1. Choose a suitable design context. Few existing products and systems to influence stakeholders' engagement and where any critical artefact scenarios are likely to be novel to stakeholders.
2. Exercise stakeholders' open-minded, "anything's possible" thinking so that they can engage imaginatively with critical artefacts.
3. Educate the stakeholders in the design context so that they can engage subjectively in the context, in an informed manner.
4. Ensure the critical artefacts are not too highly resolved and emphasise their experience of use in their presentation.
5. Select the right kind of stakeholders. Those easily able to engage in creative thinking and those who are interventionists.

Getting the Right Kind of Stakeholders: Lead Users

Assuming that a suitable design context is selected as suggested in point one above, during workshops 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 scenarios.

I do not specifically need stakeholders to be co-designers (although not an unwanted trait, it is not central to what is required). In the critical artefact approach the designer does the designing as influenced by participating in discussions with stakeholders. So, this suggests stakeholders more likely to usefully engage in the workshops are:

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

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 into the functional sources of innovation in the late 1970s and early 1980s where he discovered that, in certain fields, users[4] rather than manufacturers were frequently the sources of innovation (1986, 1988). 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

4 "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.

months or years earlier than the majority of the target market' (von Hippel, 2007 p300)

Lüthje & Herstatt have termed these characteristics motivation and capability respectively (2004). In earlier papers von Hippel discusses the motivation characteristic in terms of financial benefit – lead users innovate for profit. Latterly 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 (2007). Although 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' (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 such `typical users' may be able to usefully participate in product development in slow moving fields, where the pace of change is fast he suggests these `users steeped in the present are thus unlikely to generate novel product concepts which conflict with the familiar' (1986 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 participants in my approach? 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 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 may 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). So, 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-ness" as an indicator of open-minded, imaginative people.

However von Hippel has shown that not only are lead users *likely* to innovate, a large proportion *do* innovate (2005). 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: "is this how I would do it?"; "how does this compare to my solution?"; "could you try X solution instead?".

In selecting participants based on lead users characteristics there are some questions that need addressing. Selecting based on particular traits could be seen as elitist – only including the views of a few rather than a representative sample of all stakeholders. If my approach is to follow the ideals of human-centred design then the understanding it produces should reflect all stakeholder needs. How accurate is this understanding if a restricted set of stakeholders is used with very particular experiences different to the majority? The capability characteristic offers an answer. Lead users do experience needs different to the majority, but these needs will be experienced by the majority in due course. So it is legitimate to use lead users if an appreciation of future needs is required.

Von Hippel also developed strategies for using lead users in market research. He observed that lead users are often the driving force of innovation; so in order to innovate, use lead users as a resource. As such lead users' role is not to represent a stakeholder community *completely* rather their role is to help foster innovation as the members of that community most likely to do so. So it is acceptable to use lead users as *part* of a human-centred design process as long as this phase is associated with innovation.

The types of context in which lead users occur are also significant. Von Hippel's 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 that user-led innovation is more likely in areas where there is a greater heterogeneity of needs (2005) – individual users have specific and different needs to their peers. For example Luthje et al. showed that mountain bike enthusiasts have a high heterogeneity of needs (2005). 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 approach's 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, "lead-user-ness" alone is not a good measure of such creativity. So I need to look for other characteristics to select open-minded, imaginative participants.

Applying the Implications: Digital Mementos

The author is currently working with Daniela Petrelli (an Information Scientist at the University of Sheffield) on a project where the implications and proposals described above are being applied.

The critical artefact approach is being used as a method of exploring the design of "Digital Mementos". There are numerous physical objects we use for remembering personal memories, but, with an increasing amount of our lives conducted digitally, there is an opportunity to develop digital artefacts for remembering, whether as software, digital devices or connected systems of both.

Two groups of four to six stakeholders in Yorkshire are participating in three workshops over four months. The author is responsible for devising and running the workshops and is the sole designer involved in creating the artefacts. Petrelli is participating in the workshops as an observer and will use the findings about the design context to further her own research.

At the time of writing, the artefact-centred discussion workshops have recently completed, so how the project has taken account of the above implications can be discussed – specifically in the selection of participants and the running of the workshops. The effectiveness of these measures is currently being evaluated and is not reported here.

Firstly Digital Mementos appears to be a suitable context as discussed above. Devising digital artefacts as mementos suggests novel usage scenarios, and the rate of change for digital products is rapid. Secondly one stakeholder group was recruited according to their lead user status and the other group was drawn randomly from Petrelli's existing research group.

Lead users face needs ahead of their peers and are in a position to benefit by innovating to satisfy those needs. In Digital Mementos the needs fall into two areas. The project explores 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 firstly our research required people who already create numerous digital artefacts in their personal lives. We did not specifically require people who are good with technology and computers (although that does 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 – lead users innovate to benefit, not because they (necessarily) like innovating. Secondly, we required people in the process of creating significant personal memories; memories that they will want to document for the future.

A reduced form of snowball sampling was used to select participants (Heckathorn, 1997). I identified acquaintances that could act as "recruiters"; people who could interpret my criteria for suitable participants and then recommend their own acquaintances. These "potentials" then participated in short telephone interviews where I could evaluate their suitability. A simple score card system was used to rate each potential according to how well they satisfied the three criteria, with a fourth overall rating of my instinctive feeling of their suitability. Twelve potentials were identified, some were ruled out due to the practicalities of workshop attendance, and others did not match the criteria well enough, leaving seven people identified as suitable lead user participants.

The suitability criteria included the description of specific lead user needs outlined above (creators of numerous digital artefacts and being in a life stage with significant personal memories) plus the third criterion of open-minded and imaginative people. Recruiters were talked through a one page description of these criteria, and the subsequent telephone interviews used three open questions based on each criterion.

To educate the stakeholders in the design context and exercise their imaginative thinking, they were given 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).

Conclusions

The research described here goes some way toward developing generalisable methods for the use of critical artefacts instrumentally in a human-centred design process.

My previous work demonstrated that critical artefacts could allow designers to develop insights that would be difficult to achieve via direct questioning strategies. This approach centres on engaging stakeholder groups with critical artefacts in discussion workshops. In order to develop the approach further it was implemented in the Living Rooms project with a broader group of stakeholders and the involvement of other designers. Although the design insights produced were valid and useful, previous implementations of the approach resulted in more substantial results. Reflection on Living Rooms suggested that the approach might be more appropriate in certain contexts, and that its efficacy might depend on selecting suitable stakeholders, enabling them to think imaginatively and educating them in the design context.

The Digital Mementos project offers a more suitable context for applying the approach, and evaluates the effects of careful selection and education/enabling of stakeholders. Von Hippel's notion of lead users provides a useful framework for selecting the stakeholders whose participation could lead to more substantial design insights. Digital Mementos is evaluating the effectiveness of this idea having selected one stakeholder group

according to lead user characteristics and another group with no specific selection criteria.

Further work is required to produce generalisable methods from the critical artefact approach. The results of Digital Mementos will be used to further define how the approach should be implemented: the characteristics of appropriate contexts and stakeholder participants; communicable methods of producing effective critical artefacts; and the resources and activities required to ensure useful engagement with artefacts. But it is also clear that this approach is best suited to the early stages of product development, and an understanding of how it relates to design activity in general is required. Consequently a model of this approach is being developed that identifies the point at which other design approaches become more appropriate.

References

Bowen, S. J. & Chamberlain, P. J. (2008). Engaging the ageing: Designing artefacts to provoke dialogue. In: P. Langdon, J. Clarkson & P. Robinson (eds.). *Designing inclusive futures* (pp 35-44). London: Springer.

Bowen, S. J. (2007). Crazy ideas or creative probes? Presenting critical artefacts to stakeholders to develop innovative product ideas. In: *Proceedings of EAD07: Dancing with Disorder: Design, Discourse & Disaster* (CD-ROM). Turkey.

Buchanan, R. (2001). Human dignity and human rights: Thoughts on the principles of human-centred design. *Design issues,* 17(3), 35-39.

Chamberlain, P. J. & Bowen, S. J. (2006). Designers' use of the artefact in human-centred design. In: J. Clarkson, P. Langdon & P. Robinson (eds.). *Designing accessible technology* (pp. 65-74). London: Springer.

Dunne, A. (1999). *Hertzian tales - electronic products, aesthetic experience and critical design.* MIT Press.

Dunne, A. & Raby, F. (2001). *Design noir: The secret life of electronic objects.* 1st ed., Basel; Boston; Berlin: Birkhäuser.

Heckathorn, D. D. (1997). Respondent-driven sampling: A new approach to the study of hidden populations. *Soical problems,* 44(2), 174-199.

Human Beans, (2006). *Human beans.* Retrieved on March 27 2008 from: http://www.humanbeans.net/

Janssens, N.(2006). Research by critical design: The implementation of designerly thinking on research in the field of (urban) design disciplines. In: N. Janssens et al. (eds.). *Reflections 3 Proceedings of the Sint-Lucas Research Training Sessions 2006,* 2006 (pp. 148-156). Gent, Hogeschool Voor Wetenschap & Kunst Sint-Lucas Architectuur Brussel-Gent.

Ladyman S. (2005). Parliamentary Under Secretary of State for Community *Technology and delivery of care for older people* (1/3/2005) speech transcript. Retrieved March 27 2008 from: http://www.dh.gov.uk/en/News/Speeches/Speecheslist/DH_4105328

Luthje, C. & Herstatt, C. (2004). The lead user method: An outline of empirical findings and issues for future research. *R & D management,* 34(5), 553-568.

Luthje, C., Herstatt, C. & Von Hippel, E. (2005). User-innovators and "local" information: The case of mountain biking. *Research policy,* 34(6), 951-965.

Morrison, P. D., Roberts, J.H. & Midgley, D. F. (2004). The nature of lead users and measurement of leading edge status. *Research policy,* 33(2), 351-362.

Pullin, G. (2007). Social mobiles and speaking chairs: Applying critical design to disruption, discourse and disability. In: (online).*Proceedings of EAD07 Dancing with Disorder: Design, Discourse & Disaster,* (CD-ROM).

Rust, C. (2004). Design enquiry: Tacit knowledge and invention in science. *Design issues,* 20(4), 76-85.

US Census Bureau (2007). *International Data Base* website summarising database content including population pyramids. Retrieved March 27 2008 from: http://www.census.gov/ipc/www/idb/index.html

Von Hippel, E. (2007). Horizontal innovation networks - by and for users. *Industrial and corporate change,* 16(2), 293-315.

Von Hippel, E. (2005). *Democratizing innovation.* Cambridge, Massachusetts, USA: The MIT Press.

Von Hippel, E. (1988). *The sources of innovation.* 1st ed., New York: Oxford University Press.

Von Hippel, E. (1986). Lead users: A source of novel product concepts. *Management science,* 32(7), 791-805.

Z33, (2007). *Designing critical design.* Retrieved November 12 2007 from: http://www.z33.be/index.asp?page=detailproject%7Csub=67&lang=en.

Simon Bowen

Simon Bowen returned to academia in 2003 following eight years working with audio, video, photographic and web technologies in the commercial and public sectors - initially as a user and later as a technical manager. His initial research in the human-centred design of digital products resulted in a Master of Arts in Industrial Design from Sheffield Hallam University (SHU) and a broader research interest in alternative strategies for engaging `users' in the design of novel products. His subsequent work has developed this interest via an award from the UK's Arts & Humanities Research Council for PhD research at SHU. In this research he is developing a methodology for engaging with users via "critical artefacts" (provocative conceptual designs), due for completion in late 2008.

Simon also was involved in the creation of the Lab4Living research collaboration between the Art & Design Research Centre and Centre of Health & Social Care Research at SHU, and is involved in their ongoing research into designing for the effects of ageing throughout the life course.

He still keeps his creative "hand in" via landscape and architectural photography and by building the occasional website.