Loughborough University

This item was submitted to Loughborough's Institutional Repository by the author and is made available under the following Creative Commons Licence conditions.

creative commons

COMMONS DEED

Attribution-NonCommercial-NoDerivs 2.5

You are free:

- to copy, distribute, display, and perform the work

Under the following conditions:

Attribution. You must attribute the work in the manner specified by the author or licensor.

Noncommercial. You may not use this work for commercial purposes.

No Derivative Works. You may not alter, transform, or build upon this work.

- For any reuse or distribution, you must make clear to others the license terms of this work.
- Any of these conditions can be waived if you get permission from the copyright holder.

Your fair use and other rights are in no way affected by the above.

This is a human-readable summary of the Legal Code (the full license).

Disclaimer

For the full text of this licence, please go to:
http://creativecommons.org/licenses/by-nc-nd/2.5/

INTERNATIONAL DESIGN CONFERENCE - DESIGN 2006
Dubrovnik - Croatia, May 15 - 18, 2006.

DESIGN 2006

WHAT THEY REALLY, REALLY WANT: USER CENTERED RESEARCH METHODS FOR DESIGN

V. A. Lofthouse and D. Lilley

Keywords: User centred research, Design methods

1. Introduction

The benefits of user centered research methodologies are well documented in the literature. They can reduce the potential for poorly designed or misused products; provide an insight into the complex relationship between people and their products, and be a persuasive tool for communicating wants and needs to higher management. Through these techniques, designers can gain powerful insights into the 'actual' practices, habits and needs of the users they are designing for, rather than having to rely on their own perceptions. This paper draws on the combined experiences of the authors with findings from the literature to present a range of techniques which can help designers better understand their customers and lead to the development of more appropriate products and services. Each section provides a brief description of a technique and describes its implementation process, and any associated benefits and drawbacks. The paper concludes by comparing the different methodologies, reflecting on when they should be used, the associated costs and the time required to run them. It aims to provide design researchers with a quick reference to user centered design methods.

2 Focus Groups

Traditional focus groups create a format which brings together a selection of participants to contribute in a two way debate on a particular set of issues, whilst allowing the researcher to investigate and identify group norms and explore conflicting views [May, 2001]. They have a wide range of applications and are appropriate for use at various stages of a project, most notably to establish user needs, test product designs and evaluate final concepts. The authors have found great benefits to developing focus groups which combine a number of the techniques outlined in this paper. For example in the Tencel project [Lofthouse et al., 2005] Participant Observation, Scenario of Use and Customer diaries were combined with other activities to create exciting workshop to investigate consumer perceptions of fibre.

The key to running a successful focus group is preparation. Prior to the event it is important to identify how the group will be facilitated, the length of the event and the size and the makeup of the group. An experienced, external facilitator will encourage discussion and solicit explanations, adding greatly to the quality and clarity of the data collected. The size of group should be kept to between eight and twelve people for and a length of between 1 ½ and 2 ½ hours is recommended provide all participants with the opportunity to contribute [May, 2001]. It is also critical to develop an interesting agenda which will directly tackle the areas you want to investigate. Ideally a pilot study should be carried out to confirm the suitability of the decisions made in respect of these issues. Prior to recruitment, it is advisable to draw up a customer profile such as the one illustrated Table 1 [Lofthouse et al., 2005] and to send out a pre-event questionnaire to screen for appropriate candidates. An incentive is useful for encouraging participation – in the Tencel example an aromatherapy voucher was provided.

Female	Gardens
Average age: 30 – 60 years	Into cooking
Middle/upper class	Self assured
Professional/middle management	Traditional/loyal
Family oriented	Classic look in her approach to fashion
Travels	Environmentally aware

Table 1 The characteristics of the type of customer selected for the Tencel trials

Data is ideally collected via video recording. In the ideal situation is to combine a 'fixed' video camera (wide view) with one or two 'roving' cameras to capture group discussions. Directional microphones can be an effective way of capturing groups discussions. Poor sound quality can impede the usability of results and as such the importance of adequate technical equipment should not be underestimated. It is also sensible to use more than one method of data gathering to maximise the data collection potential i.e. employing 'note-takers', encouraging direct 'feedback'. Another technique is to use coloured stickers to track and link participants decisions throughout the activities [Holbird et al, 2003]. Finally, it can also be useful to ask the participants to produce a tangible outcome such as a model or poster, which can be collected and anaylsed after the event.

Focuse groups have many advantages, but also a number of potential drawbacks. In group work it can be difficult to capture the views of individuals and group dynamics may affect who speaks and what they say. Also the data collected cannot be aggregated to represent the whole population [May, 2001] and comparison between user 'groups' is only possible if different user 'types' are pre-sorted into separate groups. Finally, compiling and analysing the data can be time consuming.

3 Participant Observation

Used predominately in the early stages of a project, participant observation, rooted in traditional social science field studies, encompasses a range of techniques and tools designed to enable researchers to access consumers thoughts, beliefs and behaviours when using a product or service [ibid]. Observation may be manual, though the use of note-taking observers located within the test environment or behind one-way mirrors [ibid], or via video and sound recording. There are pro's and con's to both approaches.

Manual observation involves manually recording verbatim, behaviours or actions in real-time. It is a demanding task which requires observers to accurately and objectively record seemingly mundane situations [ibid]. Researchers own interpretation of events may also influence how an action is recorded and subsequently analysed. It is also possible that differences in language use may be 'lost in translation'. On the positive side manual observation provides instant 'quick and dirty' data from which initial conclusions can be drawn [Maguire, 2001]. To improve the accuracy, accessibility and quality of the approach, researchers should write their notes up as soon as possible after the event; maintain continuity through a key words based filing system; and use different quotation marks to code paraphrased versus verbatim text to ensure accuracy when attributing comments [May, 2001]. Video recording provides a comprehensive record which can be analysed at leisure, reproduced and shown to participants [Maguire, 2001]. In addition video filming enables detailed footage of user actions i.e. close-ups of subjects hands to be captured [Vermeeren, 1999]. It also effectively captures sequential actions and allows a more general view to be taken. On the negative side, however, "every hour of footage captured takes up to three hours to analyse in detail" and all verbatim must be time-logged against the video tape, coded and then grouped in appropriate clusters [Evans et al., 2002].

4 User Trials

User Trials are simulations of product usage, in which subjects are aked to fulfill specified tasks in an experimental setting, using a product or product simulation [Vermeeren, 1999]. User trials are often undertaken as part of initial research to evaluate existing products, although they can be used to test working prototypes. Typically between eight and twenty-five users are recruited for user trials, during which they are provided with a series of tasks such as 'remove the lid from the jam jar' or 'select the

group of users who earn £25,000-£30,000 per annum'. Trials are ideally conducted in the customer's real environment [Maguire, 2001] and subjects are given a set timescale in which to complete the tasks. Following completion of the exercise users are interviewed about any problems or difficulties they encountered or observed. The insights gained from these interviews can enable designers to make changes which improve function, control and ease of use.

User trials provide information on user patterns and habits and allow subjects to demonstrate how they use products/ services which helps to highlight ingrained behaviours and habits. They can however be expensive to set up and it can be difficult to source the correct types of participants. Trials may also be affected by the type of tasks set. It is important that tasks are realistic and the way in which the task is introduced should be considered carefully. The scope of tasks and the order of tasks can also have an impact on the results. For example knowledge gained in early simple tasks can affect the way in which the latter tasks are performed [Vermeeren, 1999]. To preempt these problems it is advisable to run a pilot study before the main trial. Unless observation of the effects of culmative learning is a specific aim of the study it may be advisable to change the pilot group periodically to avoid over familiarity with the product, process or scenario. In addition, when selecting participants it may be prudent to ascertain if they have prior knowledge or experience in using a similar product.

5 Product-in-Use

Product-in-Use is an interactive, naturalistic, observational method designed to "capture peoples' behaviour in real-life contexts" providing an "account of the behaviour surrounding a product or activity" [Evans et al, 2002]. Product-in-Use records what people actually do, not what they say they do, capturing behaviours which people may not report or be able to articulate when asked, such as habitual behaviour. It can be used to uncover misuse of products; strategies people use to mitigate flaws in product performance; or ways in which users adapt products to better suit their needs. It can also highlight design limitations, opportunities for improved functionality and gaps between the intentioned use of a product and actual user behaviour.

A key requirement of running a Product-in-use activity is to define the scope of the research to be conducted. Once identified, a research team ideally consisting of two members drawn from dissimilar backgrounds then plans the observations of the context to be studied. This may involve "setting up a hidden camera, seeking permission to spend a day with a customer or finding suitable public locations to film." [ibid]. The research team will then capture as much customer behaviour as possible using video or still cameras, backed up by note taking to highlight points of interest. If filming overtly, subjects must be approached and the purpose to the research explained. If filming covertly, legal advice should be sought and the recommendations put in place. "Despite… limitations discrete filming is preferable… to maintain the naturalistic nature of consumer activities" [ibid].

The drawbacks of this type of technique are far reaching; they include the logistics of identifying an appropriate location and recruiting observers; the cost of and access to recording and editing facilities; and the time required to record, analyse, edit and log the data captured [May, 2001; Evans et al., 2002]. However, the visual nature of the data collected has proven to be very useful for designers. It can provide stimulus for idea generation; novel adaptations by users to improve functionality may be adopted within revised product designs; and insights into "the emotional and social context of product use" [Evans etc al, 2002], misuse or alternative use of products may inspire new innovations.

6 Customer Diaries

Activity diaries are an inexpensive method of gaining an insight into the everyday use of products and the associated habits, behaviours, problems and difficulties and are especially useful for evaluating existing products and practices in "situations where researchers find it difficult to observe customers first hand" [Evans et al., 2002]. Participants are asked to record activities, products and/or contexts specified in the scope of the task, over a period of between eight and fifteen days [Maguire, 2001]. The medium by which participants are encouraged to record data can vary, recognised approaches include: written paper diaries, video tapes, on-line input forms, drawing, postcard writing, map-

making and taking photos with disposable cameras [Maguire, 2001; Evans et al., 2002]. Although participants should be given freedom in how they express their information, consideration should be given to the comparability in analysis of information presented in different formats. To support this, structured multiple choice questions and open-ended sections are recommend [Maguire, 2001]. At the end of the test period, diaries are collected and participants interviewed about their experiences.

Customer diaries are an effective way of accessing 'real' customer experiences in 'real' contexts. The use of a visual methodology "can…help provide insights into…experiences people find difficult to put into words alone" [Evans et al., 2002, p.34]. They are also fairly inexpensive to run with the main expense being the cost of the recording medium, which depends on the mechanism selected. The drawbacks of customer diaries are that the researcher has little control over quality and depth of responses in diaries and it can be difficult to compare results if different media are used. A study carried out by the authors [Lilley et al, 2005] demonstrated some of the flaws in this methodology; as participants recorded banal behaviours with little explanation of their motives or reasons for these behaviours, for example, "put phone in pocket, got in car, took phone out of pocket, plugged in charger, put phone on car seat". In terms of analysis, the researcher must try to avoid assuming participants logic for taking a certain course of action yet the lack of information provided can prompt a number of questions; why put the phone on the seat? is there a hands-free cradle in the car? how will the user answer it if it rings? Conversely, other participants were able to discuss their motivation for certain actions for e.g. "took phone out of back pocket before sitting on seat to avoid breaking it", the reasons here are clearly articulated and the data is significantly richer. In hindsight, it may have been more productive to combine the user diary, with Product-in-Use and in-depth interviews, as this would have enabled the researchers to capture 'automatisms', record naturalistic behaviour and provide an understanding of the participants motive. This data could then be compared with participant's diaries to discern conscious from unconscious behaviour.

7 Scenario-of-Use

Using scenarios, props and costumes to assist in 'character building' and furniture arrangement to represent the product environment, 'Scenario-of-Use' aims to uncover previously unvoiced needs using role play as a cue for recall [Evans et al., 2002]. Evans et al [ibid] describe in detail how to run these types of workshops. Prior to the activity a situation of interest is identified and a basic storyline such as a 'day-in-the-life' of is generated. This is deliberately left basic and may form the first part of the workshop. The facilitators take the most important jobs in the role plays and as such must be experienced and confident. Between 5 and 20 customers are invited to attend a workshop during which they are encouraged to comment on the activities being carried out by the actors. Both the customers and the facilitator are encouraged to interrupt the action to ask questions at any point during the activity. Throughout the activity it is crucial that an informal atmosphere is maintained. Verbatim is captured and displayed according to the timeline of the story. The event can also be captured on video for analysis later.

Scenario-of-use has a number of drawbacks; participants may find the activities uncomfortable if they are unaccustomed to acting; they can be time consuming and expensive to run as they require the preparation of props, costumes and furniture; and again the data can take a huge amount of time to analyse. However, Scenario-of-use provides the opportunity to access previously unvoiced needs and desires that are not provided by traditional market research. Experience suggests that participant's feel that they can say what they want because they are 'acting' and the process allows for relationship building between designers and customers, through increased empathy and idea generation [ibid]. The final benefit is that customer verbatim is very difficult to ignore and proves to be a powerful tool for communicating wants and needs to higher management [Lofthouse et al., 2005].

8 Consumer Idealized Design

Consumer Idealized Design [Ciccantelli and Magidson, 1995] involves consumers in the actual design process. In this process users, arranged in small groups, are asked to design the concept for a new product, by suspending judgment on existing artifacts and allowing themselves to imagine the 'ideal'.

Over the period of ½ to one full day participants are given materials ranging from card and pens to 3-D blocks to enable them to generate their concepts whilst observers record their decision making process. At the end of the session participants are encouraged to present their ideas to the group. This technique incorporates aspects of 'future scenario building' practiced in 'Scenario-of-Use' workshops. 'Futuring' is a creativity technique designed to trigger novel ideas by encouraging people to consider the future [McDonagh et al., 2002] and reframe the problem. Consumer Idealized Design techniques generate creative ideas which are not based on current limitations (although participants are discouraged from basing designs on currently unfeasible 'future' technologies) so allow a more blue sky approach to idea generation. They also provide 'ideal' product information which can help form a useful wish list for companies involved in product development. This is a useful technique for situations where it is important to avoid focusing on existing products and their limitations. The key drawback of this approach is that participants may be concerned about their lack of drawing skills.

9 Web of Associations

Rooted in the theory of memetics, Marsden's [2004] online word association technique available through Brand Genetics (http://www.brandgenetics.com) enables researchers to extract and understand semantic components of brands in consumer's minds. Primarily targeted at marketers, this technique is also applicable to new product development to elicit the values people associate with particular products or brands. The word association game works by inviting subjects, to access the website via a chain e-mail, where they are prompted to enter words they associate with a given 'theme' i.e. 'healthy-living'. The website is linked to a database which recognises strong associations i.e. those frequently made by participants. Each new entry adds to an evolving 'meme-map', which resembles a mind map and charts the values or associations customers make with particular brands or themes. The concept of 'healthy-living', for example, was associated with "natural" which was then broken down into "'fresh', 'pure' and 'organic'"[ibid].

The benefits of this tool are that it is quick and easy to administer; the potential for bias is reduced as subjects enter their responses individually in isolation via the website; the 'immediate' nature of the interface solicits 'gut responses' to the prompt question and reduces the potential for post-rationalisation. By linking the website to a database which sorts and presents the data, the time required to analyse the findings is reduced. For designers or marketers launching a new product this tool is invaluable as it identifies "values rewarded by consumers but not yet 'owned' by brands" [ibid] and in doing so reveals niche areas in which to situate new products. The drawbacks of this approach are that the data obtained is subjective, based on personal values and associations therefore cannot be used to represent an entire population. These limitations would need to be made clear within the findings of any studies which utilise this methodology. In addition to this the online 'word association game' and database software, is owned by Brand Genetics and not freely available for academic use.

10 Layered games

Whilst at Cranfield University Lilley worked with a group to develop of a series of four games to investigate insight, expectation and motivation in luxury car owners, with respect to sustainability [Holbird et al., 2003]. The group sought to test the links between luxury and sustainability by embedding them within other issues or 'themes' that could be understood by the customer. This approach enabled the subject to be investigated without adversely prejudicing or leading the participants.

'Impressions' encouraged participants to consider their perceptions of themselves as luxury car owners in relation to their cars and the brand. In small groups participants were given three scales of opposing values such as 'prudent to indulgent' or 'understated to extrovert' and five cards depicting luxury cars including their own. During the activity the 'luxury car' cards were placed on the continuums by consensus, and each participant placed a card depicting their own car on each scale individually. 'Pick & Mix' sought to test participants' awareness of sustainability and the extent to which they would actively seek to reduce the environmental impact of the product. In groups of two or three, participants were asked to prioritise a series of 'luxurious' or 'sustainable' options for their cars e.g. a personalised

security service vs. fair trade manufacturing of parts. These options deliberately presented "complex 'trade-offs' between individual benefits and local or global community well-being. In 'Money talks' participants were given currency in the form of stickers and the opportunity to vote for company activities that either enhanced socially responsible actions on the part of the company e.g. investment in improving public transport or offered luxury car owners desirable activities e.g. membership in an exclusive racing car club. 'Vision Map' explicitly introduced 'sustainable development' in the context of the company, customer, car and brand. Participants were asked to conceptualise their needs as luxury car owners, and how a luxury car company could adapt to support these needs in the year 2025 through engaging in a facilitated future scenario building exercise.

To enable researchers to track decision making processes, participants were provided with individually coloured and shaped stickers, which were linked to their pre-event profile questionnaire and incorporated as 'currency' within the games. This provided a physical record of participants' journey throughout the focus group. One of the benefits of this approach was that most of the games required the participants to record their preferences or choices manually, through placing cards on a sliding scale of attributes (in 'Impressions'), selecting and prioritising cards to depict their preference of product features (in 'Pick & Mix') using stickers as 'currency' to vote for various initiatives (in 'Money Talks') and recording the results of group brainstorming on a large scale template (in 'Vision Map'). Each game produced a tangible outcome which was collected and analysed following the event. A further benefit was that the games were simple on the surface yet concealed complex information. This allowed the researchers to draw out emotional and moral responses to scenarios, whilst the participants were able to enjoy the interactive and relaxed nature of the 'games'. Preparation for this type of method is key; templates must be generated prior to the event and it is often useful to display posters outlining the timing, aims and rules of each game. A potential drawback of these games is the time it takes to design and test them and, to be beneficial, they must be specifically tailored to explore a particular issue or problem.

11 Mood Boards

Mood boards are a collection of images selected and assembled by participants in response to a brief set by the facilitator. They may be generated to represent: participant's feelings, emotions and experiences about tasks or situations; and perceptions of product use or lifestyles [McDonagh et al., 2002; Costa et al., 2003]. During the activity participants are provided with source material (i.e. brochures, magazines, newspapers etc) scissors, glue and paper. Participants can either be given access to a range of magazines from which to select images freely, or be required to choose from a pre-selected set of images. The former approach reduces any potential bias towards pre-selected images but can be time-consuming as participants have a greater degree of decision-making to carry out the task. For the latter approach McDonagh et al [2002] suggest that between 80 and 100 images are provided in identical sets to avoid potential bias. The positive aspect of this approach is that it reduces the time required for participants to assemble their boards. Following image selection, participants are asked to organize the cuttings in the 'meaningful' collage [Costa et al., 2003]. Two forms of analysis are typically employed; participants are invited to provide a brief explanation of the reasons for choosing each image (through notes written beside the selected images and verbally) and collages are interpreted by the researcher who typically analyses the content by searching for irregularities, commonalities and patterns such as recurring themes and issues, emerging from the collated collages [ibid].

Mood boards have a number of recognised benefits. They enable participants to express emotions, feelings and experiences related to products which they may otherwise find difficult to express [McDonagh et al., 2002; Costa et al., 2003]. The approach also creates tangible outcomes that designers can use as visual aids to support the ideation process [Bruseberg and McDonagh-Philp, 2001]. They are also relatively inexpensive to organise. There are however a number of drawbacks associated with using mood boards. First of all the procedure relies on subjective interpretation. If collages are interpreted by a researcher there is a possibility of contamination of thoughts (researcher and participants) and misunderstanding in terms of the meaning/significance of images. Secondly as

there is no prescribed formulae for mood boards the methodological approach is open to questioning and processes must be noted and explained [McDonagh et al., 2002]. Other more minor drawbacks include the time and effort the activity takes to set up, the fact that images used may be too literal (e.g. representing specific brands) and that users may resist taking part due to unfamiliarity.

12 Conclusions

This paper has presented a diverse range of techniques which can be used by designers to better assess the needs and desires of the customers they are designing for. The following table provides a quick comparison of the different cost and time implications of the approaches presented in this paper and suggests how they can be combined together for effective use, based on the authors' experience. Combining different techniques together within a workshop can help researchers and designers to investigate a problem from a series of different angles, providing a range of visual, verbal and written outputs which can be used as stimulus for further design processes.

Approach	Cost	Time	When to Use	Stand alone	FG	PO	UT	PIU	CD	SOU	CID	LG	MB
Focus Groups	£££ £	◔◔	Wide range of applications; - determine customer needs - gain feedback on ideas - evaluate new/existing products	■						■	■	■	■
Participant Observation		◔◔ ◔◔	- To gather stimulus for Focus Groups - Early stages of project to investigate user behaviour & gather visual stimulus	■	■								
User Trials	£££ £	◔◔	At any stage in a project where product evaluation is required.	■	■	■							
Product-in-Use	£££ £	◔◔ ◔◔	Early stages to evaluate existing products/service investigate user behaviour & visual stimulus/ idea generation	■	■	■				■			
Customer Diaries	£	◔	Early stages to evaluate existing products/ services & investigate user behaviour	■		■		■					■
Scenario-of-Use	£££	◔◔ ◔◔ ◔	Early stages to evaluate existing products/ services & investigate user behaviour	■	■			■					
Consumer Idealized Design	££	◔◔ ◔◔	Very early stages - 'futuring' technique to inspire new design solutions.	■	■								■
Web of Assoc.	£££ ££	◔	Prior to product development to reveal niche areas in which to situate new products.	■									
Layered Games	£	◔◔ ◔◔	To gain insight into target customers values & evaluate concepts /theories	■	■								
Mood Boards	£	◔◔ ◔	Early stages to gather visual stimulus for idea generation	■	■				■		■		

Table 2 Comparison of user centered research methodologies

The eclectic mix of origins of the techniques presented in this paper demonstrates that it is not always necessary or best to rely on methodologies that are specifically aimed at designers and that there may be benefits to sourcing techniques from further afield. Not only can new techniques provide interest for the participants, but they can set new challenges for those running them, have the potential to open up new ways of looking at things and are ultimately a fun way of generating new ideas. This paper reflects the belief that although it is useful to learn from the experiences of others, techniques can and should be adapted to suit the specific aims of a project. Flexibility is advisable, try not to be too prescriptive when planning activities, the authors experiences show that people often behave in ways

which are contrary to what is expected, allowing participants to move outside of the confines of a 'planned activity' can provide unexpected insights. Adaptation is part of evolution, and there are benefits to the wider research community if adaptations are disseminated to allow others to benefit from the experiences of those trying things in a different way.

References

*Bruseberg, A. and D. McDonagh-Philp, "New product development by eliciting user experience and aspirations,." International Journal of Computer Studies **55**, 2001 435-452.*

*Ciccantelli, S. and J. Magidson, " Involving Consumers in the Product Development Process." EMR **Spring**, 1995 30-34.*

*Costa, A. I. A., D. Schoolmeester, M. Dekker and W. M. F. Jongen, "Exploring the use of consumer collages in product design." Trends in Food Science and Technology, **14**, 2003 17-31.*

Evans, S., A. Burns and R. Barrett. Empathic Design Tutor. Cranfield, IERC, Cranfield University, 2002.

*Holbird, S., D. Lilley, F. Lourenço, F. Macchi, J. A. M. Gimenez, K. Stewart and G. Wood (2003). Integrating sustainability into luxury brands of ****** and **** *****. Manufacturing Sustainability and Design. Cranfield, Cranfield University, 2003.*

Lilley. D, Lofthouse. V A, and Bhamra. T (2005) 'Investigating Product Driven Sustainable Use', in: Sustainable Innovation 05, Global 'state of the art' in sustainable product/service development and design, 10th International Conference, 24th – 25th October 2005. Farnham Castle International Briefing and Conference Centre, UK

*Lofthouse, V. A., T. A. Bhamra and T. Burrow, "A new way of understanding the customer, for fibre manufacturers." International Journal of Clothing Science and Technology. **17**(5), 2005 349-360.*

*Maguire, M., "Methods to support human-centred design." International Journal of Computer Studies **55,** 2001 587-634.*

Marsden, P., Brand Positioning: Memes the Word 2004.
http://www.brandgenetics.com/archive/Brand%20Positioning%20-%20Memes%20the%20Word.htm

May, T.. Social Research: Issues, methods and process. Buckingham, Open University Press, 2001.

*McDonagh, D., A. Bruseberg and C. Haslam, "Visual product evaluation: exploring users' emotional relationships with products." Applied Ergonomics, **33,** 2002, 231-240.*

*Vermeeren, A. P. O. S.Designing Scenarios and Tasks for User Trials of Home Electronic Devices. Human Factors in Product Design: Current Practice and Future Trends Taylor and Francis, London. W. S. Green and P. W. Jordan**:** 1999 47-55.*

Dr. Vicky Lofthouse,
Research Fellow in Sustainable Design,
Department of Design and Technology,
Loughborough University,
Loughborough, Leics. LE11 3TU UK
Phone: +44 (0) 1509 222777 Email: v.a.lofthouse@lboro.ac.uk