Selecting & working with stakeholders at the

fuzzy front end of design

Deliverable 26.2

May 2010

www.ideasintransit.org

CONTENTS

Introduction

The aim of this deliverable is to bring together background literature and previous project research relating to co-design and the 'fuzzy front end' of innovation and/or design. This is the stage where the problem space is being understood, experiences are being shared and ideas are being generated. It also dovetails into the concept generation stage. The document focuses on 2 main areas: the co-design approach and how to select users to take part in co-design studies during the fuzzy front end of design. In particular it aims to:

- Provide an overview of Co-design and its use within the fuzzy front end of design (Section 1)

- Identify previous research that addresses how the choice of participants for involvement in this early stage of design may influence its outcomes (Section 2)

SECTION 1: Co-Design at the fuzzy front end of design

1.1 The fuzzy front end

At the earliest stages of design the boundaries between research and design are blurred as what is to be designed is yet to be decided. Different terms have been used to describe this earliest stage of the design process. These include: the fuzzy front end; the messy front end; pre-design; ideation; problematising; generative design; discovery and formative user research. The term the 'fuzzy front end' is familiar to both New Product Development (NPD) and Design Research practitioners and is therefore an appropriate term for this research.

The fuzzy front end, so called because of its "ambiguous and chaotic nature, describes the many activities that take place in order to inform and inspire the exploration of open ended questions. In the fuzzy front end it is often not known whether the deliverable of the design process will be a product, a service, an interface or something else. The goal of this exploration is to define the fundamental problems and opportunities and to determine what is to be or should not be designed…" (Sanders and Simons 2009) Therefore gaining a true understanding of user needs is critical to this stage (Mulder and Stappers 2009).

The design process can be represented by what has been colloquially referred to as 'The Squiggle' (fig 1) This illustrates conceptually the growing emphasis in design placed upon the fuzzy front end of the process (Sanders and Stappers 2008). The front end of the squiggle emphasises the unstructured and often uncharted process leading to the definition of what is needed.
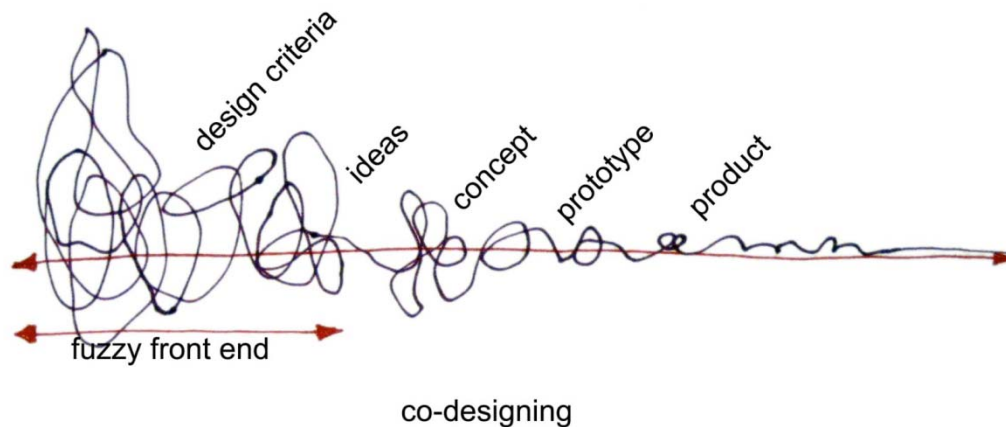
Figure 1 The Squiggle

1.2 Wicked problems

Sustainability is an example of a 'wicked problem' a term first coined by Rittel to characterise social policy problems that are: " ill-formulated, where the information is confusing, where there are many clients and decision makers with conflicting values, and where the ramifications in the whole system are thoroughly confusing" (Churchman 1967). Leading design agencies such as IDEO, previously focussed on product design are now being commissioned to apply 'design thinking' to such 'wicked' problems (see for example Burns et al 2006, Brown 2008, Fuad-Luke 2009). This is raising the overall profile of user centred design and in particular co-design within both government and commercial organisations.

1.3 Co-design

Within design research and practice, the term Co-Design is used to describe approaches that bring people together with designers to formulate solutions to complex problems. Although the term Co-design is currently gaining popularity within design research and practice, Sanders and Stappers (2008) note that Participatory Design has been around for over 40 years and is essentially the same collective creative practice.

Co-design can be defined as "a cooperative, continuous process bringing everyday people together with design professionals to find new and better ideas for daily life." (Scott et al 2009). A key aspect of this approach is consideration and involvement of a wide range of stakeholders as the solutions adopted to address complex problems affect more than just the end users of a proposed product or service (Albinsson et al 2008). In contrast to traditional UCD practices where users involvement in the earliest stages of design are largely passive (users are predominately observed and interviewed) co-design approaches often actively engage users in the idea generation process. This has led to the adaptation of tools and techniques currently

used by designers for design exploration to create tools to help users participate in these earliest stages of design.

Sanders and Simons 2009 define *co-creation* as any act of collective creativity that is experienced jointly by two or more people where the intent is to create something that is not known in advance. *Co-design* is a specific instance of co-creation where collective creativity is applied throughout the design process. They identify the following types of co-creation:

- co-creation within communities
- co-creation inside companies and organizations
- co-creation between companies and their business partners
- co-creation between companies and the people they serve, who are variously called customers, consumers, users or end-users

Within the proposed Ideas in Transit study we are primarily seeking to provoke co-creation within a community in order to foster user innovation. This will require adaptation of existing co-design methodologies which focus predominantly upon co-creation between design teams and users.

Sanders and Stappers (2008) highlight how a move from a traditional UCD to co-design changes the roles held by users, designers and researchers within the design process. Within UCD the user is often the passive object of study. The researcher will contribute knowledge of the intended users developed through user research and the application of theory. The designer will then use this knowledge to creatively generate and communicate design concepts within the constraints of the design brief. In co-design the users are treated as *experts of their own experience* and are enabled through the co-design process to play a larger role in understanding the problem, developing knowledge, idea generation and concept development (see figure 2)
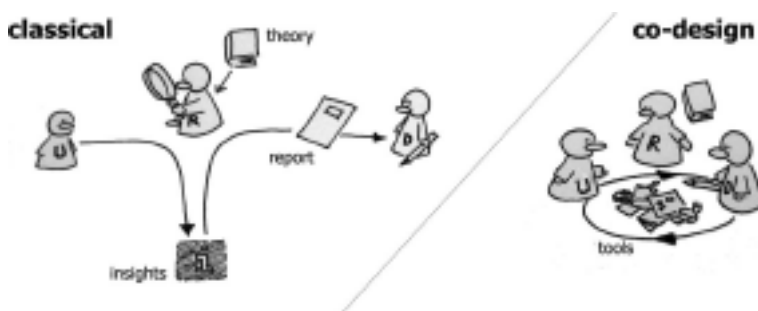

Figure 2 changing roles of users in the design process (from Sanders and Stappers 2008)

To enable users to operate effectively in this role, researchers are required to act less as translators between users and designers and instead operate more as facilitators. It is common for the researcher and designer roles to merge within co-design as design activities previously undertaken solely by designers become more collaborative acts of co-creation. This requires UCD researchers to adopt a more 'designerly' mindset which requires greater use of visual communication methods, willingness to work with incomplete and often ambiguous information and more rapid iteration between problem and solution spaces.

Sanders and Stappers (2008) assert that "all people are creative but not all people are designers." The degree to which users co-create with designers will depend, they argue, on the "expertise, passion and creativity of the user." Sanders (2006) identify four levels of creativity within people's lives: *doing*, *adapting*, *making* and *creating* (see table 1). The amount of expertise, passion and effort needed varies with *doing* requiring the least and *creating* the most. People can be expected to exhibit all levels of creativity within different aspects of their lives. For example they may be at the *creating* level when it comes to dress making but at the *adapting* level when using technology products.

Table 1 Four levels of creativity from Sanders (2006)

Level	Type	Motivated by	Purpose	Example
4	Creating	Inspiration	"express my creativity"	Dreaming up a new dish
3	Making	Asserting my ability or skill	"make with my own hands"	Cooking with a recipe
2	Adapting	Appropriation	"make things my own"	Embellishing a readymade meal
1	Doing	Productivity	"getting something done"	Organising my herbs an d spices

Sanders and Stappers argue that different approaches are needed to engage users within a co-design design process that take into account these different levels of creativity. The methods used must:

- *lead* people who are at the *doing* level of creativity
- *guide* those who are at the *adapting* level
- *provide scaffolds* to support and meet peoples' need for creative expression at the *making* level and
- *offer a clean state* for those at the *creating* level.

As everyone is likely to function at each level of creativity somewhere within their everyday lives, the co-design toolkit must provide tools that give people the discretion to contribute at the level at which they feel most comfortable.

Mulder and Stappers (2009) identify a number of prerequisites that are needed to support co-creation when seeking to achieve social transformation. As the Loughborough study is seeking to change the attitudes and behaviours of University staff, students and other stakeholders these principles should underpin the study.

- The belief that all people are creative and will participate in a creative process if they are motivated and provided with the tools to do so
- Diversity should be a key driver: If all participants are of the same background, perspective and opinion, the outcome may be limited and even predictable
- The focus at the fuzzy front end of the process should be joint problem definition, not just joint problem solving

- Co-design workshops should be supplemented by methods that enable a continuous dialogue and conversation between stakeholders
- The study should include the development and use of design tools, materials and methods that put all stakeholders on a common ground
- There should be a focus on experiences not just on products and services
- There should be a focus on understanding the whole of an experience not just an episode or single touch point.

1.4 Tools and techniques for Co-Design

1.4.1 Generative techniques

A key component of the facilitator role within co-design is the design of the co-design 'toolkit' that is used to enable users to express themselves creatively within the co-design process. Mulder and Stappers (2009) emphasis that both tools for expression and time for reflection are needed to enable people to function as "experts of their experience." The concept of generative tools and techniques was introduced by Sanders to describe design activities that are intended to help people express themselves within co-design sessions and in particular to reveal tacit knowledge and latent needs (Sanders 2001).

Generative activities typically involve participants generating artefacts and materials that stimulate observation, reflection and discussion. Generative activities encourage storytelling as people explain to others (fellow co-designers – everyday people, researchers and designers) what they have made and also supplement what people can express in words (either verbally or in text).

Sanders (2001) provides a design research framework to explain the role of generative tools within a Co-Design process. She advocates the use of a range of techniques to understand people's needs and desires. Listening to what people have to *say* reveals explicit knowledge but is limited to what they can verbalise or put down in words. Observing what people actually *do* supplements what they say and helps the designer immerse themselves in the context of use and empathise with others. Generative or '*make*' tools, Sanders argues, enable people to express their thoughts and feelings, and express their own creative ideas. The visual nature of the tools enables people to express themselves beyond what they can state in words. The tools particularly allow people to dream and imagine how things could be in the future. Sleeswijk Visser et al (2005) summarise the relationship between different data gathering techniques using the following diagram (figure 2)
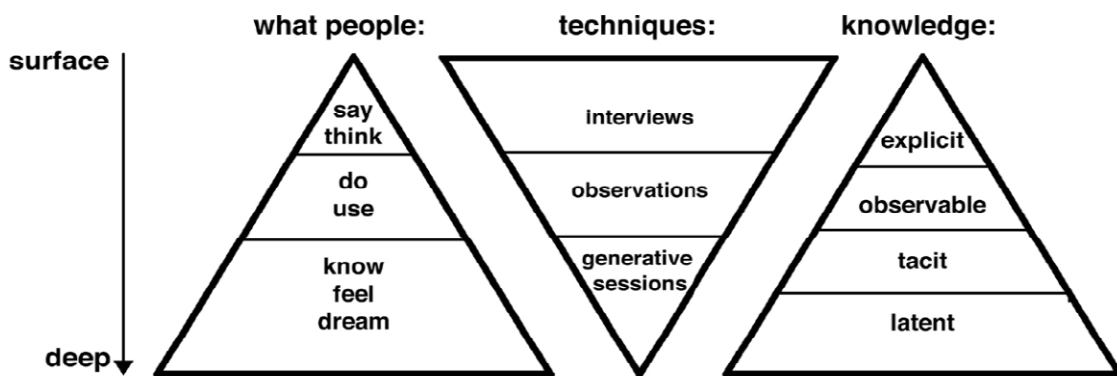
Figure 3 different levels of knowledge accessed through different techniques

Sanders (2001) provides guidance on the relative strength of different data collection methods in relation to whether the design team is seeking to capture knowledge relating to past, present or future experiences. Whereas what people *do* provides knowledge relating only to the present, what people *say* can provide insight into experiences people have had with products and services in the recent past and could possibly have in the immediate future. What people *make* she argues can be used to extend recollection of experiences further into the past (memories) and further into the future (into dreams). This is illustrated in figure 4
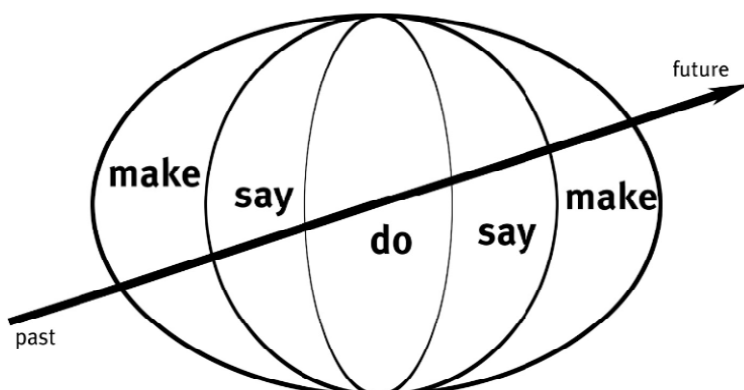

Figure 4 how say, do and make tools provide insight into past, present & future experiences (from Sanders 2001)

A primary motivation for using generative tools and techniques is to enable creative expression and to enable people to generate and communicate innovative ideas and solutions. This is encouraged through using tools which contain deliberately ambiguous visual stimuli that can be interpreted in different ways by the co-design participants. This together with the opportunity to express ideas visually and not just in words is said to liberate people's creativity.

1.4.2 Sensitising tools

Sensitising tools are generative tools designed to encourage participants to go through a process of reflection perhaps over several days or weeks before engaging in co-design sessions or workshops (Sleeswijk Vissner et al (2005). The principles behind the design of these tools are outlined below as design of a sensitising toolkit will be a core element of the first study.

Sensitising tools often take the form of Cultural Probes which are design-oriented user research toolkits based on self-documentation (Gaver et al 1999). The Cultural Probe technique emerged from research within the Royal College of Art (RCA) conducted by Bill Gaver and colleagues in the 1990s. They developed an artist–designer approach to user research that aimed to gather inspirational data "only partly guided by an objective problem statement". The Cultural probes approach has since be adapted and refined by other researchers and probes are now used to fulfil a number of different roles within UCD (Mattelmaki 2005). The focus in this report is, however, upon their use as sensitising tools within a co-design process.

An example of a Cultural Probe is provided in figure 5. Common elements include: maps that the users can annotate, cameras, audio recorders, postcards, diaries and deliberately ambiguous tasks to provoke users to think about their experiences in unconventional ways.

Figure 5 cultural probe kit from Gaver et al (1999)

Cultural Probes are not primarily aimed at documenting activities but are purposefully designed to provoke users to reflect on and visualise their experiences, feelings and attitudes. Sleeswijk Vissner et al (2005) provide the following guidance for the design of Cultural Probe packages intended to be used as sensitising tools:

- The tools should encourage participants to tell stories about their experiences
- Tools should be both playful and professional so that they are fun to complete but also help participants feel that their views and opinions are being taken seriously
- The focus of the sensitising tools are usually broader than the focus of planned study
- The activities in the package should be inspirational and provocative.
- Participants should be encouraged to reflect on their experiences over a number of days to enable patterns to emerge. Diaries and photo taking exercises can help enable this.

- Participants can be wary of writing on pre- prepared materials unless the design of materials encourages this. Plenty of white space and opportunities to note down ideas and thoughts should therefore be built into the layout of paper based materials.

- Activities should not take more than 5 – 10 minutes a day although many participants will spend considerably more time if they become engaged with the topic.

Mattelmaki (2005) emphasises that each probe kit should be designed to meet the particular needs of each study and the characteristics of the users involved. The design of the sensitisation package for this study will therefore take place once the choice of participants and problem focus for the study have been finalised.

SECTION 2:

Choosing users for idea-generation in a co-design approach

Despite acknowledging, that not all people are designers and that different levels of creativity are likely to be exhibited by users who are invited to engage in co-design processes, the co-design literature provides surprisingly little guidance on who (as representatives of the user community) to involve within the co-design process.

Therefore the aim of this section is to provide a background to the selection of participants for the 'fuzzy front end' of the co-design process. The motivation behind this review is to provide a basis on which to choose participants for a co-design study at Loughborough University which will use the University as a 'mini-community' on which to test co-design methods to generate sustainable transport innovations.

The sources of information used for this section are:

1. Source A - The existing Ideas in Transit literature review, particularly the description of 'lead users' in this domain.

2. Source B - The findings of the Ideas in Transit innovator interviews, particularly the analysis of the catalysts for the ideas and the motivations to pursue and develop the idea.

3. Source C - A new desk study to find previous research that has attempted to characterise and select the 'best' users for idea-generation, i.e. at the 'fuzzy front end' of a co-design approach

2 Source A - Lead user background from initial IiT review

Almost all user-developed ideas and prototypes of general commercial interest tend to be developed by 'lead users' (von Hippel and Sonnack, 1999). According to Herstatt and von Hippel (1992), lead users of a novel or enhanced product, process or service are those who display *both* of two characteristics:

1. they face needs that will be general in a marketplace, but face then months or years before the bulk of the marketplace encounters them and

2. they expect to benefit significantly by obtaining a solution to those needs.

Further describing the relationship between lead users and user innovation, von Hippel (2005) finds that the correlation found between innovation by users and lead user status is highly significant and that effects are very large.

The characteristics that Lettl (2007) ascribed to 'innovating consumers' do not completely match the classic 'lead user' definition. The inventive users were facing problems that were also being faced by others in the (medical) domain, i.e. they did not have needs that were ahead of the marketplace. They, in fact, were lead users with respect to new technologies, experiencing extreme needs such as very high precision. Lettl (2007) also describes a search grid for 'technology lead users'.

Luthje et al (2002) discuss the features of users who generate ideas (but don't necessarily innovate, i.e. put the ideas into practice). Again, in the context of mountain biking, these users (in comparison to those without ideas): spent more time carrying out the sport, had been involved for longer and were active in a wider range of speciality areas (e.g. jumping, endurance riding). Innovative *ideas* were triggered by direct and repeated personal experience.

In terms of the diffusion of innovations, Anon, (2007) states that the term 'lead users' is not congruent with that of 'early adopters and, indeed, they are often not existing customers. This contrasts with an earlier view (Luthje, 2000) that a higher proportion of innovating consumers (than non-innovating consumers) buy products immediately after market introduction.

A final point to make about lead users is that not all turn their ideas into innovations (i.e. put the idea into practice). Luthje at al found that aspects of use experience did not explain why some users build their ideas into prototypes (in the mountain biking field), but that it was explained by the level of personal (technical) knowledge.

3 Source B - Catalysts and motivations for grassroots innovations in transport

The table below summarises the catalysts for innovation elicited from the thematic analysis of the innovator interviews. In each case the innovators were driven by a range of interrelated motivations some of which emerged after they began to pursue their idea. The interviews sought to uncover what initially triggered their desire to innovate – the 'catalysts for innovation'.

- Responding to an unmet need (n=16)

- Personal frustration with current products and services (n=13)

- Seeking to create social value (n=13)

- Passion for a cause or interest (n=12)

- Financial gain (n=11)

- Enjoyment - learning new skills, exploring capabilities of data or software, problem solving (n=8)

In all 16 cases the innovators were responding to identified unmet needs although this was never the sole motivation for innovating. A number of additional often overlapping motivational factors emerged from the thematic analysis: personal frustration with current products and services (13 cases); seeking to create social value (13); a passion for a cause or interest (12); the opportunity to benefit financially (11); and having fun problem solving or playing around with technology (8).

In all but 3 cases the innovator was motivated by *personal* frustration with existing products or services. Frustration related to the lack of convenient and reliable alternatives to private car use; lack of information relating to travelling or holidaying sustainably; and lack of up to date readily accessible public transport information. In the remaining cases the innovator was frustrated by current service provision. However, although motivated by personal frustration, the majority of these innovators did not align to the conventional definition of user innovators as they had responded to their frustrations by seeking to create products and services that provided value for others rather than primarily for themselves. Although the innovations of 3 cases all provide social value (e.g. by reducing traffic on the roads) the innovators motivations were first and foremost commercial.

Another strong theme emerging from the analysis of motivations was passion for a cause or interest. In 7 of the 12 cases attributed to this theme the innovator reported that their concern for the environment had encouraged them to pursue their innovation. Three others were motivated by their passion for a hobby. The innovators from the civic focussed software companies were, not surprisingly, strongly motivated by their desire to create a fairer, more open society. Both were seeking to demonstrate, primarily to policy makers, how well-presented information and data could be used to improve society for both individuals and communities.

Although 11 of the innovators acknowledged that the opportunity to gain financially had motivated them to innovate, in all but 3 of these cases this was reported to be secondary to their desire to provide social value. Financial success was said to be needed, not only to sustain the innovation and therefore its societal impact, but also to gain commercial credibility. This was viewed as necessary if alternative ways of doing things were to be seriously considered by government and industry.

All of the innovators reported having to spend long hours developing and promoting their innovations, often in their own free time outside of their regular employment. However, having fun problem solving, learning new skills or exploring the potential of technology was cited in 8 of the 16 cases as a motivating factor. In 3 cases the innovators were already expert programmers who were, through the innovation process, exploring the potential of new software tools. In one case, the innovator wanted to create an application in order to learn how to program for the Apple iPhone. He chose to develop an application that provided live status updates for the London Underground in response to his frequent commuting problems.

In one case the innovator was similarly seeking to practice a new skill, in this case creating a website for the first time. He was a passionate train traveller and this led him to create a site showing how to travel within Europe by rail.

For another, the innovator's prime motivation for innovating was to prove a point to others within his technical community.

4 Source C - Desk study on selecting the 'best' users for the 'fuzzy front end' of design

To seek previous studies which have identified the best users to involve in the fuzzy front end of design and/or innovation, i.e. idea generation, concept generation. The main focus was to find descriptions of how the users were characterised, operationalised and recruited.

4.1 Scope of literature review

4.1.1 Main search terms

Users	Stage of design	Approach
• Selecting/choosing/identifying/finding/recruiting users • Selecting/choosing/identifying/finding/recruiting participants • Criteria for users/participants • User involvement • Lead users (approach, method) • Extreme users (approach, method) • Expert users • Creative users	• Idea generation • Concept generation • Ideation • Fuzzy front end	• Participatory design • Co-creation • Co-design • (User-centred design)

4.1.2 Main sources & dates

Sources – MetaLib, Google Scholar

Dates of searches – April-May 2010

4.1.3 Main research domains

Design research, co-design

Creativity and innovation (management, research, marketing)

Computer-human-interaction

Service/system research

4.2 Results - literature based on lead user approach

4.2.1 Bowen, 2008, 2009

Context:

Bowen's research focuses on the use of critical; artefacts for engaging users in new product ideas. Studies using more traditional sampling procedures found that users focused on the mundane (e.g. appearance, function, cost) rather than thinking creatively around situations, experiences, values and needs.

Fundamental characteristics:

Bowen therefore aimed to involve users who were easily able to engage in creative thinking and those who are 'interventionists'. This is summarised as:

- 'imaginative people, able to envisage themselves in fictional scenarios'
- 'people in tune with the possibilities of novel situations'

He therefore chose users based on the two primary lead user characteristics of 'need' and 'benefit'. He discusses the pros and cons of involving users and concludes it is acceptable so long as the ideas are for future products.

Operationalised characteristics:

Based on this, in the 'Digital mementoes' study, the 3 final criteria were:

1. People who already use digital technology in their personal lives – they create lots of 'artefacts' that could later trigger memories. But, crucially, people that 'end up' using technology because they are trying to satisfy a need, not because they are technically-inclined ('gadget fans').
2. People in the process of creating significant personal memories – memories they will want to document for the future.
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.

The choice of users was based on a telephone interview using a rating system for each criterion (plus, the interviewer relied on their 'instinctive feeling of suitability' of the interviewee). A second group of 'un-filtered users' was used as a control group.

Outcomes:

Subjectively, Bowen felt that the filtered group:

- supported his understanding of the context more effectively
- were more open-minded in their reception and subsequent engagement with the critical artefacts
- held a more insightful discussion

(The unfiltered group were more dismissive and less likely to engage imaginatively)

A more quantitative analysis of the video, tallying user 'engagements' subjectively against 10 categories (e.g. 'off-topic', 'constructive', 'dismissive') showed that:

- both groups engaged mostly in the conceptual/experiential sense but the filtered group engaged twice as often as the unfiltered
- the filtered group's positive engagement tallies were higher than that of the unfiltered group
- the unfiltered group's dismissive engagement tally was double that of the filtered group

4.2.2 Kanstrup & Christiansen, 2006

Context:

The area of innovation was a device to reduce electivity use in the home.

Fundamental characteristics:

Their criteria for 'innovators' were based on **Thomke & von Hippel (2002)**, i.e. customers:
- with needs
- with engineering skills
- with little experience with traditional development (i.e. not 'stuck' in too much experience and traditional thinking.

Plus
- families with young children (identified as creative by a pilot study)

Operationalised characteristics:

Users were included in the sample if - when asked if they would be involved in a study to develop future homes - they answered Option 2 'we will most likely say yes because we think that it could be fun and exciting' or Option 4 'we will most likely say yes to participate because we don't know so much about the subject but like to participate and learn more about the subject'.

8 families were recruited including 6 with young children.

Outcomes:

The main conclusion was that 'people openly interested in re-arranging their environment and its technology, and not 'stuck; with too much experience, make excellent innovators' and 'those who are most suited to rearrange their environment are those who can, those who take a pleasure in doing so, and those who get the opportunity'.

4.2.3 Bragge, Marttiin, Tuunanen, 2005

Context:

The context of their work is the development of new mobile services

Fundamental characteristics:

They propose the use of existing, or new, virtual communities to generate ideas, determine user requirements and evaluate prototypes. The use of distributed Group Support Systems is proposed. Finding lead users in virtual communities has been covered in the literature:

- Jeppesen & Moiln, ref 36 – there are 3 types of consumer in virtual communities - the first type is best characterised as lead users – they use the product and develop innovative applications, they have relatively in-depth and specific knowledge of certain aspects of the products and they keep themselves up to date by interacting with peers.
- Franz and Wolkinger <ref3> and Piller et al <ref 37> confirm that virtual communities are a perfect source of lead users
- ref 2 introduced the concept of Community Based Innovation, which is founded on social exchanges and interaction theory.

Operationalised characteristics:

None

Outcomes:

The authors have proposed a framework but had only started their study at time of writing.

4.2.4 Mulvenna, Galbraith, Martin, 2009

Context:

The focus of the research is the health and wellbeing domain as part of the European network of Living Labs (ENOLL) which number over 100, accounting for a network of more than 70 million end users

Fundamental characteristics:

The research is based in the lead user method

Operationalised characteristics:

They have taken 3 'lead user' approaches, although 'lead user' is not operationalised in this paper:

- the traditional lead user
- proxy lead user (e.g. a carer of someone with dementia)
- the lead user dyad (user and proxy lead user)

Outcomes:

none reported

4.3 Results - literature using approaches other than lead user

4.3.1 Fischer, 2008

Context:

This paper is mostly focused on open source software development but has some reference to other work of relevance.

Fundamental characteristics:

The underlying characteristuics are not described.

Operationalised characteristics:

Fischer (2005, their ref) states that 'exploring spatial temporal and conceptual distances will provide additional foundations for rethinking software design in participation cultures:

- Spatial 'voices from different places' – from different locations – 'allows shared concerns rather than shared location to be the defining feature'
- Temporal 'voices from the past' – relates more to software design re later developers being able to build on earlier iterations
- Conceptual 'voices from different communities' – communities of interest (i.e. urban planners plus end users) as opposed to communities of practice (i.e. urban planners only, end-users only) to facilitate building a shared understanding of the task, perspectives and vocabularies.

Outcomes:

None reported

4.3.2 Boeddrich, 2004

Context:

The research focuses on idea generation, capture and evaluation in company environments (i.e. via employees), with this paper concentrating on the process for the fuzzy front end of innovation

Fundamental characteristics:

Individuals can be profiled according to introversion/extroversion and rational vs creative problem solving which have an impact on an individual's 'inner struggle' between their creative impulse and hesitation in putting the idea forward.

Operationalised characteristics:

Four archetypes (which can also be used as four 'profiling' dimensions) are identified:

- The Emotional perceiver
- The Reserved scientist
- The Open communicator
- The Dominant entrepreneur

Any one individual is usually a mix of these types and their profile can be plotted on a four point matrix.

Outcomes:

The model has not been validated but is based on background theory. It can be used for (i) people to reflect on their own profile; (ii) to identify what encouragement individuals need to generate ideas; (iii) identify deficiencies in the mix of people in innovation groups. Applicability of the profiling outside the domain of this paper (in-company, employee ideas) would need to be carefully considered.

4.3.3 Holmquist, 2004

Context:

Within the 'Future Applications Lab', initial ideas usually comes from new/emerging technical possibilities (usually well on their way in the prototype stage) rather than user need.

Fundamental characteristics:

Their user engagement approach is quite lateral. The users are often highly specialised with particular, often peculiar, requirements (rather than the intended end users). The authors consider them as 'extreme users' (an analogue to 'extreme characters' a persona in interaction design). The participants are used as a source of inspiration rather than a set of end users who set the spec. They reduce the risk of innovation being limited by user demands (but the authors do aim to avoid technology for its own sake).

Operationalised characteristics:

Examples of extreme users include:

- Using 'heavy pin board users' at a local film festival (used for scheduling) to inspire ideas for 'Pin and Play' – a conductive board that you can press self-contained computer elements into, creating networks with other elements.
- Using 'lomographers' who take photos using cameras that have unpredictable effects to inspire ideas for context sensitive photography (e.g. indicating hot vs cold, noisy vs quiet)

There is little operational description of how/why these participants were chosen in relation to that technology.

Outcomes:

No evidence is reported with regard to measurable benefit over 'traditional' approaches. It could be an interesting approach is starting from technical possibilities rather than problem solution.

4.3.4 Matthing, Kristensson, Gustafsson, Parasuraman, 2006

Context:

The application domain of this research is the development of technology-based services.

Fundamental characteristics:

The research tests the predictive value of the Technology Readiness (TR) construct (Parasuraman, 2000) in assessing the value of involving particular users.

Operationalised characteristics:

TR has been operationalised into the TRIndex (based on 36 questions) and the TRQuotient (based on 10 statements). Although this research is not theoretical based on the lead user literature, TR has been found to be related to lead users of new technology (but this appears to be more in relation to technology uptake than user innovation)

Outcomes:

They found that Technology Readiness correlates with:

1. Adoption of new technology-based services
2. Propensity to actively seek new technologies and solve problems related to them
3. Willingness to participate in the process of new technology-based service development
4. Creativity in terms of both quantity and quality of innovative ideas generated.

3 and 4 are particularly relevant to user involvement in co-creation/co-design activities.

The measure of 'creativity' used for 4 was based on the 'creative performance' construct (Im & Workman 2004) which consists of 3 dimensions derived from the creativity literature:

- Fluency – number of ideas generated
- Flexibility – number of different categories of idea generated
- Originality – qualitative – a person's ability to think or truly novel ideas (measured using Consensual Assessment Technique (CAT) derived from Amabile (1996) and used panels of judges rating originality from 1 to 10

Consideration needs to be given to whether high-TR users will generate ideas that will appeal to low-TR users (now or later)

4.3.5 Magnusson, Matthing, Kristensson, 2003

Context:
Their study focused on the development of telecoms services (particularly ideas for an SMS-to-Internet service). They state that there are few examples of engaging users in innovation for <u>service</u> design and that most research has been on tangible products and industrial markets.

Fundamental characteristics:
This paper focuses on the difference between users and professionals and the level of direction that the users are allowed.

Operationalised characteristics:
The main thrust of the research was to find out, experimentally, whether there was a difference between the quality of innovative ideas generated by 3 different groups

- Professional
- Users (working alone)
- Users who could consult professional re feasibility and whether the idea was new (but the professionals could not contribute ideas back)

Other user characteristics were also measured but not used for selection. These were

- Creativity (ES-test, Holmquist & Ekvall, 1986)
- Positive or negative disposition (Life Orientation test, Scheir & Carver, 1985)
- Technology readiness (Parasuraman, 2000)

Outcomes:
The quality of the innovative ideas was measured based on originality, user value and producibility (variables determined by 5 experts in mobile telephony service development). The assessment of ideas used the

Consensual Assessment Technique (CAT) (Amabile, 1996) – six experts, experienced in evaluating mobile communication service ideas ranked on a scale of 1 to 10.

The results were:
- Ordinary users – Originality YES, User value YES, producibility NO
- Consulting users - Originality NO, User value YES, producibility YES
- Professionals - Originality NO, User value NO, producibility YES

(note: re consulting users – there was a side benefit of 'educating' professional re user needs; plus inspiring ideas in professionals, but in this study these additional ideas couldn't be shared with the users)

5 Main findings to consider in Ideas in Transit co-design study

5.1.1.1   The user innovation literature states:

Lead users are those who display <u>both</u> of two characteristics (Herstatt & von Hippel, 1992):
- They face needs that will be general in a marketplace, but face them months or years before the bulk of the marketplace encounters them and
- They expect to benefit significantly by obtaining a solution to those needs

Luthje et al (2002) discuss (in the context of mountain biking) the features of users who generate ideas (but don't necessarily innovate, i.e. put the ideas into practice):
- Spend more time carrying out the sport
- Had been involved for longer
- Were active in a wider range of speciality areas

5.1.1.2   The innovator interviews found that the catalysts and motivations of the innovators were:

- Responding to an unmet need
- Personal frustration with current products and services
- Seeking to create social value
- Passion for a cause or interest
- Financial gain
- Enjoyment - learning new skills, exploring capabilities of data or software, problem solving

5.1.1.3   The desk study uncovered previous approaches that are worth pursuing:

The studies vary in terms of their start points:
1. An existing technology/technological possibility – 'what could we do with this?
2. A design artefact as a prompt – 'what do you think of this as an idea'
3. Problem-focused – e.g. 'how could future homes be designed to save electricity?'
4. Person-focused – e.g. 'what mobile services would you like?'

5. Company-focused – employee ideas

Therefore the appropriateness of the participant characteristics, methods and measurable outcomes would need to be assessed according to the start point of any new study.

Some proposed 'criteria' for selecting users included

Bowen 2008, 2009 – easily able to engage in creative thinking and those who are 'interventionists', summarised as:

- imaginative people able to envisage themselves in fictional scenarios
- people in tune with the possibilities of novel situations

Bowen 2008, 2009 – based on the lead user characteristics of 'need' and 'benefit', i.e. in his 'digital mementoes' study operationalised as:

- people who already use digital technology in their personal lives, driven by need
- people in the process of creating significant personal memories
- imaginative, open-minded people
- (plus an instinctive feeling of their suitability)

Kanstrup & Christianssen, 2006 (based on Thomke & von Hippel, 2002) – customers with

- Needs
- Engineering skills
- Little experience with traditional development (and hence not 'stuck')
- (plus people with young children)

Bragge, Martiin, Tuuanen, 2005

- using virtual communities to find lead users

Mulvenna, Galbraith, Martin, 2009 used 3 'lead user' approaches

- the traditional lead user
- the proxy lead user
- the lead user dyad

Fischer, 2008

- Spatial 'voices from different places'
- Temporal 'voices from the past'
- Conceptual 'voices from different communities'

Boeddrich, 2004 – four dimensions based on extroversion/introversion and rational vs creative problem solving (to profile people in a company setting, i.e. employees)

- the emotional perceiver
- the reserved scientist
- the open communicator
- the dominant entrepreneur

Holmquist, 2004

- Using extreme users (highly specialised with particular, peculiar requirements)
- Not meant to be the end users

Matthing, Kristensson, Gustafsson, Parasuraman, 2006

- Technology Readiness (operationalised into TRIndex and TRQuotient

Magnusson, Matthing, Kristensson, 2003

- Ordinary users vs Consulting users vs Professionals (varied on level of originality, user value, producibility of ideas)

Metrics for judging the output of different users/groups of users included:

Bowen, 2008, 2009

- Tallied user 'engagements' subjectively (from video) against 10 categories (e.g. 'off-topic', 'constructive', 'dismissive'.

Matthing, Kristensson, Gustafsson, Parasuraman, 2006

- 'Creativity' based on the 'creative performance' construct (Im & Workman, 2004) which has 3 dimensions: Fluency (number of ideas); Flexibility (number of different categories of ideas); Originality (measured using the Consensual Assessment Technique and judged by a panel of experts)

Magnusson, Matthing, Kristensson, 2003)

- 'Quality' based on: Originality, User Value, Producibility (measured using the Consensual Assessment Technique and judged by a panel of experts)

5.2 Summary

The Ideas in Transit co-design study aims to select the appropriate participants (and appropriate methods) to tackle sustainable travel challenges experienced by Loughborough University. The objective is to generate innovative ideas that could be developed into solutions. The selection of participants will be based on

1. The lead user characteristics identified in the established user innovation literature (Source A)
2. The characteristics underlying the catalysts and motivations of grassroots innovators in transport (as identified in the innovator interviews) (Source B)
3. The participant characteristics explored by other research at the fuzzy front end of design (Source C)

The precise characteristics to implement will be chosen once the problem space has been more clearly defined and hence the 'start point' of the study is determined.

6 References

6.1 Co-Design References

Albinsson, L., Forsgren, O. and Lind, M. (2008) Towards a Co-Design Approach for Open Innovation *Position paper presented at the Designing for Codesigners Workshop* October 1st 2008 inconjunction with the Participatory Design Conference 2008. Bloomington, Indiana. Workshop documentation available online at: http://mlab.taik.fi/co-design-ws/

Brown, T. (2008) Design Thinking Harvard Business Review June 2008 pp1 -10

Burns, C. Cottam, H., Vanstone, C., and Winhall, J (2007) Red Paper 02 Transformation Design. The Design Council

Churchman, C.W. (1967) "Wicked Problems," Management Science, (December 1967), vol. 4, no.14, B-141-42

Fuad-Luke, A. (2009) Design Activism: Beautiful Strangeness for a Sustainable World. Earthscan

Gaver, W., Dunne, T., Pacenti, E. (1999) Cultural Probes ACM Interactions 6(1), 21-29

Mattelmaki (2005) Applying probes-from inspirational notes to collaborative insights. CoDesign, Volume 1, Issue 2 April 2005 , pages 83 - 102

Mulder, I and Stappers, P.J (2009) Co-creating in Practice: Results and Challenges In Proc. Of 15th Int.Conf on Concurrent Enterprising ICE 2009 Collaborative Innovation: Emerging Technologies, Environments and Communities pp1-8 Nottingham Centre for Concurrent Engineering

Sanders, E B-N (2001) Virtuosos of the experience domain Proceedings of the 2001 IDSA Education Conference,

Sanders, E B-N (2006) Design Serving People. In Salmi, E., and Anusionwu, L. (Eds) *Cumulus Working Papers,* Copenhagen, University of Art and Design, Helsinki, Finland, 28-33

Sanders, E B-N and Simons, G (2009) A Social Vision for Value Co-creation in Design. *Open Source Business Resource,* December 2009

Sanders, E B-N. and Stappers, P.J (2008) Co-creation and the new landscapes of design CoDesign, Volume 4, Number 1, March 2008 , pp. 5-18(14)

Sanders, E B-N and William, C. T Harnessing People's Creativity: Ideation and Expression through Visual Communication. In Focus Groups: Supportive Effective Product Development, Langford, J., McDonagh-Philp, D. (Eds), London: Taylor and Francis

Scott, K. Quist, J and Bakker, C (2009) Co-design, social practices and sustainable innovation: involving users in a living lab exploratory study on bathing. *Joint actions on Climate Change Conference* Aalborg, Denmark, 8 -10 June 2009

Sleeswijk Visser, F., Stappers, P.J., van der Lugt, R. and Sanders, E. B-N (2005) Contextmapping: experiences from practice In CoDesign, Volume 1, Issue 2 April 2005 , pages 119 - 149

6.2 References for Source A – Lead User Literature

Anon (2007). User Innovation. Strategic Direction, 23(8): 35-37.

Herstatt, C. and E. von Hippel (1992). FROM EXPERIENCE: Developing New Product Concepts Via the Lead User Method: A Case Study in a "Low-Tech" Field. Journal of Product Innovation Management 9(3): 213-221.

Lettl, C. (2007). User involvement competence for radical innovation. Journal of Engineering and Technology Management 24(1-2): 53-75.

Luthje, 2000

Lüthje, C., C. Herstatt, et al. (2002). The dominant role of "local" information in user innovation: The case of mountain biking, MIT Sloan School Working Paper.

Von Hippel, E. (2005). Democratizing Innovation. Cambridge, MA, MIT Press.

von Hippel, E. and M. Sonnack (1999). Breakthroughs to Order at 3M via Lead User Innovation, MIT Sloan School of Management, Working Paper #4057.

6.3 References for Source C – Desk Study on 'Best' Users

Boeddrich, H. J. (2004). Ideas in the workplace: A new approach towards organizing the fuzzy front end of the innovation process. *Creativity and Innovation Management, 13*(4), 274-285.

Bowen, S. J. (2008). Getting it right: Lessons learned in aaplying a critical artefact approach. *Undisciplined! Proceedings of the Design Research Society Conference 2008,* 441/1.

Bowen, S. J. (2009). A critical artefact methodology: Using provocative conceptual designs to foster human-centred innovation. (Doctor of Philosophy, Shefiield hallam University). , 1-252.

Bragge, J., Marttiin, P., & Tuunanen, T. (2005). Developing innovative information systems services together with wide audience end-users.

Fischer, G. (2008). Rethinking software design in participation cultures. *Automated Software Engineering, 15*(3), 365-377.

Holmquist, L. E. (2004). User-driven innovation in the future applications lab. *CHI'04 Extended Abstracts on Human Factors in Computing Systems,* 1092.

Kanstrup, A. M., & Christiansen, E. (2006). Selecting and evoking innovators: Combining democracy and creativity. *Proceedings of the 4th Nordic Conference on Human-Computer Interaction: Changing Roles,* 330.

Magnusson, P. R., Matthing, J., & Kristensson, P. (2003). Managing user involvement in service innovation: Experiments with innovating end users. *Journal of Service Research, 6*(2), 111.

Matthing, J., Kristensson, P., Gustafsson, A., & Parasuraman, A. (2006). Developing successful technology-based services: The issue of identifying and involving innovative users. *Journal of Services Marketing, 20*(5), 288-297.

Mulvenna, M., Galbraith, B., & Martin, S. (2009). Enriching the research & development process using living lab methods: The TRAIL experience

7   Bibliography

7.1   Reviewed but excluded from the desk study report

Light, A., & Miskelly, C. (2009). Brokering between heads and hearts: An analysis of designing for social change.

Sanders, E., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign, 4*(1), 5-18.

7.2   Printed but not yet reviewed

Boyd-Graber, J. L., Nikolova, S. S., Moffatt, K. A., Kin, K. C., Lee, J. Y., Mackey, L. W., et al. (2006). Participatory design with proxies: Developing a desktop-PDA system to support people with aphasia. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 160.

Christiansen, E., & Kanstrup, A. M. (2007). A mobile design lab for user-driven innovation–history and concept. *Seventh Danish HCI Research Symposium,* 9-10.

Dong, H., Clarkson, P. J., Cassim, J., & Keates, S. (2005). Critical user forums-an effective user research method for inclusive design. *The Design Journal, 8*(2), 49-59.

Floyd, I. R., Jones, M. C., Rathi, D., & Twidale, M. B. (2007). Web mash-ups and patchwork prototyping: User-driven technological innovation with web 2.0 and open source software. *System Sciences, 2007. HICSS 2007. 40th Annual Hawaii International Conference on,* 86-86.

Heiskanen, E., & Repo, P. (2007). User involvement and entrepreneurial action. *Human Technology, Jg, 3*, 167–187.

Hisarciklilar, O., Rasoulifar, R., Boujut, J. F., Thomann, G., & Villeneuve, F. (2009). User-designer collaboration in the design process of surgical instruments: New aspects for annotation as a communication tool.

Howell, J. M., & Boies, K. (2004). Champions of technological innovation: The influence of contextual knowledge, role orientation, idea generation, and idea promotion on champion emergence. *The Leadership Quarterly, 15*(1), 123-143.

Humphreys, T., Leung, L., & Weakley, A. (2008). Embedding expert users in the interaction design process: A case study. *Design Studies, 29*(6), 603-622.

Jacobson, S., & Pirinen, A. (2007). Disabled persons as lead users in the domestic environment. *Proceedings of the 2007 Conference on Designing Pleasurable Products and Interfaces,* 167.

Keinonen, T. (2008). User-centered design and fundamental need. *Proceedings of the 5th Nordic Conference on Human-Computer Interaction: Building Bridges,* 211-219.

Kratzer, J., & Lettl, C. (2008). A social network perspective of lead users and creativity: An empirical study among children. *Journal Compilation, 17*(1)

Kratzer, J., & Lettl, C. (2009). Distinctive roles of lead users and opinion leaders in the social networks of schoolchildren. *Journal of Consumer Research, 36*(4)

Kujala, S. (2003). User involvement: A review of the benefits and challenges. *Behaviour & Information Technology, 22*(1), 1-16.

Kujala, S., & Kauppinen, M. (2004). Identifying and selecting users for user-centered design. *Proceedings of the Third Nordic Conference on Human-Computer Interaction,* 297-303.

Lettl, C. (2007). User involvement competence for radical innovation. *Journal of Engineering and Technology Management, 24*(1-2), 53-75.

Lettl, C., Herstatt, C., & Gemuenden, H. G. (2006). Learning from users for radical innovation.

Liikkanen, L. A. (2010). Extreme-user approach and the design of energy feedback systems. *ENERGY EFFICIENCY IN DOMESTIC APPLIANCES AND LIGHTING,* , 23.

Lilien, G. L., Morrison, P. D., Searls, K., Sonnack, M., & Von Hippel, E. (2002). Performance assessment of the lead user idea-generation process for new product development. *Management Science, 48*(8), 1042-1059.

Magnusson, P. R. (2009). Exploring the contributions of involving ordinary users in ideation of technology-based services*. *Journal of Product Innovation Management, 26*(5), 578-593.

Neustaedter, C., & Brush, B. (2006). LINC-ing the family: The participatory design of an inkable family calendar. *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems,* 150.

Repo, P., Heiskanen, E., & Kotro, T. (2007). Involving users in the product development of SMEs. *Proceedings of the Good, the Bad and the Unexpected: The User and the Future of Information and Communication Technologies, Moscow, Russian Federation, 23rd-25th may,*

Sanders, L. (2008). ON MODELING an evolving map of design practice and design research. *Interactions, 15*(6), 13-17.

Steen, M., Kuijt-Evers, L., & Klok, J. (2007). Early user involvement in research and design projects–A review of methods and practices. *23rd EGOS Colloquium (European Group for Organizational Studies),* 5-7.

Vavoula, G. N., & Sharples, M. (2007). Future technology workshop: A collaborative method for the design of new learning technologies and activities. *International Journal of Computer Supported Collaborative Learning, 2*(4), 393-419.

Weng, C., McDonald, D. W., Sparks, D., McCoy, J., & Gennari, J. H. (2007). Participatory design of a collaborative clinical trial protocol writing system. *International Journal of Medical Informatics, 76*, S245-S251.

7.3 *Not yet printed*

Bendavid, Y., & Bourgault, M. (2010). A living laboratory for managing the front-end phase of innovation adoption: The case of RFID implementation. *International Journal of Project Organisation and Management, 2*(1), 84-108.

Bilgram, V., Brem, A., & Voigt, K. I. (2008). User-centric innovations in new product development Â systematic identification of lead users harnessing interactive and collaborative online-tools. *International Journal of Innovation Management (Ijim), 12*(03), 419-458.

Elfvengren, K., Kortelainen, S., & Tuominen, M. (2009). Managing the front end of innovation with a group support system. *International Journal of Entrepreneurship and Innovation Management, 10*(3), 266-279.

Magnusson, P. R. (2009). The delicate balancing act of trying to understand user perspectives on technology-based services. *Use of Science and Technology in Business: Exploring the Impact of using Activity for Systems, Organizations, and People,* , 315.

Molenmaker, L., Kratzer, J., & Achterkamp, M. (2008). Lead users in social networks of children. *Young Consumers, 9*(2), 90-103.

Oosterloo, N., Kratzer, J., & Achterkamp, M. (2010). Applying lead user theory to young adults. *Young, 11*

Skiba, F., & Herstatt, C. (2009). Users as sources for radical service innovations: Opportunities from collaboration with service lead users. *International Journal of Services Technology and Management, 12*(3), 317-337.

Winthereik, J. C. T., Malmborg, L., & Andersen, T. B. (2009). Living labs as a methodological approach to universal access in senior design. *Universal Access in Human-Computer Interaction. Addressing Diversity:*

5th International Conference, Uahci 2009, Held as Part of Hci International 2009, San Diego, CA, USA, July 19-24, 2009. Proceedings, 174.

Appendix 1 – Summaries of desk research papers (Source 3)

Boeddrich, 2004 – Creativity & Innovation Management (Journal)

The research domain is idea generation, capture and evaluation in company environments. The focus in this paper is on the fuzzy front end of innovation. Much of the paper covers the process but a model of 4 'idea types' for employees and their inclination to solve problems.

Ideas emerge in alpha-wave situations (e.g. daydreaming, small talk with friends, have a shower) and therefore, the capture of ideas should be possible at any time (i.e. not time/location constrained)

Before people put ideas forward they have an inner struggle between

- the creative impulse (dependent on extroversion and inclination to creative problem solving)

- hesitation (influenced by introversion and inclination to solve problems in a rational - linear-analytical – way.

Introversion/extroversion and rational/creative problem solving results in 4 archetypes (Kolb 1984, Smith & Kolb 1986) as described by Myers/Briggs or C.G. Jung (Bents & Blank 1992, Jung 1960)

The Emotional Perceiver

- make the world a better place

- traditional values

- good listener

- perceives emotions

- creative problem solving

- hesitates to publish ideas

The Reserved Scientist

- likes achieving highly sophisticated results

- wants his work to be appreciated

- requests leadership

- concentrates on topics in question

- linear-analytical problem solving

- afraid of publishing ideas because hates criticism

The Open Communicator

- likes to be a star

- bright and brilliant presentations

- likes ad-hoc organisation

-]improvisation skills

- Greta at convincing others

- Creative problem solving

- Communicates ideas anywhere anytime

The Dominant Entrepreneur

- Integrates contributions to achieve company goals

- Focuses on accepted objectives

- Dominant ruler

- Greta at delegating

- Prefers linear-analytical problem solving (but accepts creative if this is exhausted

No-one fits exactly into one, most people are a mix

Questionnaire (their Appendix A) has 8 situations, 4 options (each relates to one of the above types). Total points on each scale gives a profile on 4 point matrix

Non-validated model, but:

- Can be used to identify what encouragement individuals need to provide ideas

- Individuals can also use it to reflect on their own profile

- Could help to identify deficiencies in innovation groups

SUMMARY

The extent to which a person fits the four idea types can be identified via a questionnaire and plotted on a four pronged matrix.

Characterising people in this way could be useful to ensure a good mix (or match) of groups to work with

Although this model is, in this paper, applied to employees ideas within companies, it could still be applicable to the wider context (unless fit to type is dependent on situation i.e. work vs home).

Further investigation of the idea types is needed to determine its applicability to the transport context and whether there are alternative questionnaires for different contexts and what the results mean for individuals ability to come up with ideas and suitable methods to fit the types.

Follow up

- Literature on the idea types, non-workplace questionnaires and applicability to the transport context.

Bowen, 2008 – Design Research Society Conference

This paper focuses on the use of critical artefacts for engaging users in new products ideas. A lead user approach was implemented and discussed.

Initial trials used critical artefacts to aid the design of homes for older people. Participants were selected to represent four broad categories of stakeholders 'future old, 'active old', 'frail old' and carers. The findings were that the users focused on the mundane (e.g. appearance, function, cost) rather than thinking creatively around situations, experiences, values and needs.

One factor that the authors felt contributed to this was that they may have been using stakeholders not best suited to the activity, i.e. not easily engaged in creative thinking, less likely to explore solutions to their own problem. They state that this is quite controversial as it is counter to the 'inclusive' aspects of human-centred design

Following on from the early study, which had limited success, they continued to the next phase in testing other approaches and, particularly of relevance here, to select the right kind of stakeholders – those easily able to engage in creative thinking and those who are 'interventionists'. This is summarised as:

- 'imaginative people, able to envisage themselves in fictional scenarios'

- 'people in tune with the possibilities of novel situations'

Bowen identifies the lead user traits identified by von Hippel (2007 p300, his ref) as:

1. 'lead users expect attractive innovation-related benefits from a solution to their needs and so are motivated to innovate, and

2. lead users experience needs that will become general in the marketplace, but experience them months or years earlier than the majority of the target market'

Bowen identifies some of the pros and cons to involvement of lead users in his context (future, novel products):

Pros

- experience of future needs

- able to judge whether design solutions are relevant or not

- more implicit insights into future needs

- creative thinkers

- those that do innovate will have learned/improved creative thinking skills and be able to engage constructively in evaluating solutions

Potential cons

- Lead users innovate for gain

- Elitist? Views of a few, rather than representative sample of all stakeholders (in conflict with HCD ideals) – but von Hippel identifies that they experience needs ahead of a trend which suggests that majority will have same needs in <u>future</u>. I.e. their role is not to represent a stakeholder community completely but to help foster innovation as the members of that community most likely to do so.

Therefore it is acceptable to use lead users so long as the ideas are for <u>future</u> products

Also discussed are the environments in which lead users occur:

- Greater heterogeneity of needs (von Hippel, 2005)

- Therefore individual user have specific and different needs to their peers

- And 'manufacturers' therefore can't satisfy all the needs (especially if a rapidly developing area)

- Therefore lead users are more likely to arise

TR - How does this relate to transport? Diversity of needs?

TR - Also, are there differences between lead user creativity in a 'natural' setting as opposed to a 'forced' setting? i.e. PD studies. Will this affect creativity?

This recruitment thinking was used in research on **'Digital Mementos'**. In summary, the main features were:

- One stakeholder group recruited according to lead user status, other group drawn randomly from an existing research group (but no identification of whether these were assessed according to lead user characteristics also)

- People who already create numerous digital artefacts in their personal lives

- Did not specifically require people who are good with technology and computers (although this didn't rule them out

- Did recruit people who use technology frequently because they are trying to satisfy a need, not because they are technology-inclined (follows from lead user characteristics of innovate to benefit not innovate because they like it)

- People in the process of creating significant personal memories

- Used a reduced form of snowball sampling (Heckathorn, 1997, their ref) – identified acquaintances that could act as recruiters (understood recruitment criteria), they recommended their acquaintances. They completed a phone interview using score card rating (not explained) for 3 criteria (creators of numerous digital artefacts, being in a life stage with significant personal memories, open-minded and imaginative) and fourth overall rating of instinctive feeling of their suitability. Recruiters had one page description of each criterion, and an open ended-question for each.

- First part of method – to 'educate the stakeholders in the design context and exercise their imaginative thinking' – part 1 = market trends; part 2 = reminder that once 'other worldly' ideas were now commonplace.

SUMMARY

The main focus of Bowen's research is the use of critical artefacts to engage users with new product ideas (rather than generating innovations themselves from scratch), but this often does generate new ideas. This paper focused on criteria for selecting users

The main requirements were: those easily able to engage in creative thinking and those who are 'interventionists'. This is summarised as:

- 'imaginative people, able to envisage themselves in fictional scenarios'

- 'people in tune with the possibilities of novel situations'

Chose users based on lead user characteristics of 'benefit' and 'ahead of trend'

Discusses to pros and cons of involving users and concludes it is acceptable so long as the ideas are for <u>future</u> products.

Recruitment criteria for Digital Mementoes study:

- Lead user group vs 'randomly selected' sample (but no further details or operationalising of 'lead user')

- People who create a lot of digital artefacts

- People who use technology a lot to satisfy a need (not necessarily 'techie' but not ruled out)

- In process of creating significant personal memories

Created a briefing sheet for recruiters who conducted phone interview and gave a rating on 3 criteria:

- creators of numerous digital artefacts

- being in a life stage with significant personal memories

- open-minded and imaginative

- and fourth overall rating of instinctive feeling of their suitability

Follow-up

- Future publications by the same author that provide results and proof of the benefits of the approach (see Bowen, 2009)

- The definition of the 3 criteria (see Bowen, 2009)

- 'Snowball sampling' technique (Heckathorn,1997)

Bowen – PhD Thesis, 2009

Further information of the recruitment strategy and outcomes of the Digital mementoes study introduced in Bowen, 2006.

Recruitment

Based on von Hippels notion of lead users as:

1. facing needs ahead of their peers and

2. in apposition to benefit by innovating to satisfy those needs

Based on this, in this study, the 3 finally defined criteria were:

1. People who already use digital technology in their personal lives – they create lots of 'artefacts' that could later trigger memories – e.g. photos, emails, 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')

2. People in the process of creating significant personal memories – memories they will want to document for the future

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.

Appendix A (p229) describes these more fully with examples for recruiters to use

The recruiters used the following questions (summarised, see p 151 for full text)

1. Consider a digital home product bought recently (what did you hope to use it for? have you use it like this or differently? What additional features does it need?)

2. What sort of things now will you want to remember in future?

3. What do you do differently to others?

Interviewees were rated 0-no match to criteria; 1-modearte match; 2-strong match

Plus instinctive feeling of suitability

Resulted in traffic light rating green – highly suitable; amber – moderately suitable; red-unsuitable.

Only greens and ambers included.

Accepted that not necessarily 'lead users' but exhibiting 'lead user-ness'

2 groups – filtered according to criteria vs. random

Results

Subjective feeling of response of filtered group:

- supported development of understanding of context more effectively

- more open-minded in their reception and subsequent engagement with the critical artefacts

- discussion more insightful

(unfiltered group more dismissive, less likely to engage with them imaginatively)

More 'objective' analysis of engagement (10 categories - e.g. 'off-topic', 'constructive', 'dismissive' – grouped into 2 negative, 2 neutral, 6 positive). Tallied video recordings (1=moderate match; 2 = strong match), totalled number of 'engagements per minute)

- both groups engaged mostly in conceptual/experiential sense but filtered group twice as often as unfiltered

- filtered group positive engagement tallies higher than unfiltered

- unfiltered groups dismissive engagement tally was double that of filtered

(Also compared with results from an earlier study – living rooms)

SUMMARY

The 3 criteria are interesting but not very well grounded in theory

Analysis of outcomes rather subjective

Follow-up

None?

Bragge, Marttiin, Tuunanen – Proceedings of the 38th Hawaii International Conference on System Sciences, 2005

The context of their work is the development of new mobile services

The background to their approach is that the traditional lead user approach/snowball sampling is burdensome for companies in terms of finding lead users and the time in engaging with them (plus geographical challenges). Refs 33, 34

They seem to mix up Roger diffusion of innovation and von Hippels' lead user approach on occasion (i.e. seeing them as the same).

They also are not clear if they are tacking the 'fuzzy front end' or the 'requirements engineering' stage with their approach. Although later it seems to cover both of these plus evaluation.

They propose the use of existing or new virtual communities to generate ideas, determine user requirements and evaluate prototypes. The use of distributed group Support Systems is proposed

The paper does not really touch on creativity but state that GSS has benefits such as:

- 'utilizing the internet is claimed to speed up the process [of NPD] and cut the costs of it, and bring a larger base of customers, among other things' <ref 65>

- 'field research results on GSS show savings up to 50% of person hours and project time when compared to regular meetings' <ref 57>

Finding lead users in virtual communities has been covered in the literature:

- Jeppesen & Moiln, ref 36 – there are 3 types of consumer in virtual communities - the first type is best characterised as lead users – the use the product and develop innovative applications, they have relatively in=-depth and specific knowledge of certain aspects of the products and they keep themselves up to date by interacting with peers.

- Franz and Wolkinger <ref3> and Piller et al <ref 37> confirm that virtual communities are a perfect source of lead users

- Designing such a community requires a careful; plan and adaptation to the situation <ref 35, 38>

- ref 3 – web survey and hybrid conjoint analysis to differentiate between preferable products offerings – found that community members and especially the identified lead users are very willing to provide the ne4cessrasy information to develop ne products (TR – not clear if this is at fuzzy front end or reqs or evaluation)

- ref 2 introduced the concept of Community Based Innovation, which is founded on social exchanges and interaction theory.

- Refs on virtual communities and social life – 40, 41, 42

- Communities of practice are also referred to re refs 43, 44, 45 (TR - although Fischer paper determines Communities of Interest as more productive)

- Sawhney & Prandelli <ref 35> have listed prerequisites for the deign of communities related to creation of new products – common interest, sense of belonging, shared language, ground rules for participation, explicit economic purpose, sponsor, mechanisms to manage IPR, physical support of sponsor, co-operation (first 4 – any community, latter 5 – start from explicit economic purpose as in NPD)

GSS can be used for ideation, organisation, evaluation and consensus building

Ref 30 showed that best to involve users in idea generation and products conceptualisation and evaluation (i.e. not throughout)

Snowballing/networking technique to find lead user s reported by ref 34

Has been used for information systems planning – ref 66 where simple market segmentation was used first to scope participant selection

Web-base conjoint analysis for development and evaluation has received interest in NPD as have other toolkits – refs 3, 37, 39, 67, 68, 69. But the authors see this as too structured to enable creation of radical innovations.

Study just started

- used literature to find distinct characteristics of lead users in general and then extended this within the context of mobile services

- recruitment took place in 2004

- 3 data gathering locations – Helsinki, Hong Kong, Las Vegas (Helsinki new technique, others used snowball sampling)

- Aim – how we can distinguish the right lead users for a particular project and if they can use complementary virtual communities for finding these

- Will lead to more exact process models, feasibility tests of GSS sessions and the whole framework

SUMMARY

The authors have proposed a framework (see Fig 1) but had only started their study at time of writing

Using virtual communities (plus the other refs related to communities in NPD) (might be of use in our work – see refs 2 and 3 in particular

Follow-up

Refs – 2, 3, 9, 10

Same authors re the result s of the study introduced at the end of this paper.

Fischer, 2008 – Automated Software Engineering Journal

This paper is mostly focused on open source software development but has some reference to other work of relevance. Particularly (Fischer 2005, their ref) states that 'exploring spatial temporal and conceptual distances will provide additional foundations for rethinking software design in participation cultures:

- Spatial 'voices from different places' – from different locations – 'allows shared concerns rather than shared location to be the defining feature'

- Temporal 'voices from the past' – relates more to software design re later developers being able to build on earlier iterations

- Conceptual 'voices from different communities' – communities of interest (i.e. urban planners plus end users) as opposed to communities of practice (i.e. urban planners only, end-users only).

Basically brining together stakeholders in UCD terms. The paper states that the fundamental challenge is are building a shared understanding of the task, perspectives and vocabularies.

SUMMARY

Rather too focused on collaborative software development than innovative services but Fischer 2005 criteria for the diversity of groups might be relevant:

- 'voices from different places'

- 'voices from the past'

- 'voices from different communities'

Follow-up

- Fischer 2005 ref

Holmquist – CHI 2004 (Conference)

The Future Applications Lab uses users as a 'resource' to help generate innovations (mainly in mobile & ubiquitous technologies). The user group employed is often highly specialised but are not necessarily the intended end users of the innovation.

They often have very particular, sometime peculiar, requirements. They are considered 'extreme users' an analogue to 'extreme characters' a persona in interaction design <Djajadiningrat, 2000, ref 1>

I.e. the users are not a reference group used to set the spec of the innovation but a source of inspiration. This approach is inspired by, but different from, participatory design. The researchers term it 'user-driven innovation'

The research is also characterised by:

- Projects already well on their way in the prototype stage

- An interest in cutting-edge technology (initial ideas usually come from technical possibilities rather than user need)

  The approach reduces the risk that technical innovation is limited by demands of a particular user group. However, they emphasise that they wish to avoid technology for its own sake.

2 examples are given:

Pin & Play <Hakansson et al, 2003, ref5>

- a conductive board that you can press 'self-contained' computer elements onto; creating a network with other elements

- yet to find a truly compelling use case

- recruited 'heavy pin board users' at a local film festival who use pin boards for scheduling

- realised other scheduling use cases and therefore pushed technology in new directions

Context photography

- digital camera plus sensors e.g. to indicate loud vs quiet or hot vs cold on the image

- no technology yet, looking for ideas to extend the photo raking process

- recruited specific photography group the 'Lomographic Society' who use Russian cameras which produce unpredictable effects (i.e. they celebrate uncertainty)

- although lomographers found it interesting they had many objections e.g. the ability to preview = no uncertainty

- despite the fact that they would not be end users they inspired new ways of thinking about photography

SUMMARY

An interesting approach for inspiration - using specialised, particular, peculiar groups who are not necessarily the intended end users.

There is little operational description of how these 'extreme users' are chosen, except perhaps that hey are already performing a lower-tech intensive activity that has some relation to the innovation in question.

Also, there is no evidence that the 'extreme users' provide more inspiration than would 'ordinary' users.

This research takes a technological innovation (or potential innovation) as a start point rather than a 'problem space'. Therefore the approach may be useful to the transport context if the idea generation is based on – 'this is what technology can do, what sorts of things could be made possible?' as opposed to 'this is the problem, what solutions might there be?'

Follow-up

- the references 4 and 5 for more detail of the 2 exemplar studies

- 'extreme characters' a persona in interaction design <Djajadiningrat, 2000, ref 1>

Kanstrup and Christiansen, 2006 – NordiCHI (conference)

Stated that the issue of how to, in practice select participants capable of innovating had not been tackled to date.

To date, the participants they had indentified as 'innovators' had the following characteristics:

- Probably not future users but brought in because they 'represent the web of relationships between user and product as quoted by Margolin' 1995 <ref 31>

- They represent the product context, which they describe as 'a practice so rich, that the professional designers are not able themselves to determine the constellations of preferences, attitudes and habits that will eventually determine use'. They also state this as a disadvantage in that they are so immersed in this everyday that knowledge about it is tacit. They do not term this 'sticky information' anywhere but this is essentially what they are referring to.

- They are brought in because they represent Rogers <ref 35> 'vast majority' with respect to attitudes to technology.

In the FEEDBACK project running from 2006-7 (which looked at methods of feedback that could bring about electricity saving in private households) they selected innovators on the basis of:

- **Thomke & von Hippel (2002) criteria:**
  Customer (i) with needs & (ii) with engineering skills (iii) with little experience with traditional development (i.e. not 'stuck' in too much experience and traditional thinking.

- **Own pilot study on what characterised innovators re practical attitude to technology (with respect to Thomke & von Hippel's criteria):**
  Applied Thomke & von Hippel's characteristics to comparable families (based on age, profession, income, attitude to environment). Very newly moved in to apartment with new electricity monitoring. They asked them about the technology, why they bought it, their expectations of it (TR – it is not clear how this relates to innovation potential, apart from the visions of future use). The video data was analysed according to Activity Theory (Bodker 1996) <ref 5> Operations (where hands go), Action (how they talk about what they do/don't do), Motive (re what they want to do).
  Couple 1: Operations-pointing, Actions-describe what can do, excuses for not doing, Motive-reiterated sales pitch. (interpretation=lack of ops and engineering skills)
  Couple 2: Ops-pointing, Actions-describe limitations, Motive-ridiculed, not what we need (interpretation=lack of motivation, ;stuck')
  Couple 3: Ops-showing remote control, pulling connectors; Actions-how they set it up using intuition, Motive-future thinking of possibilities (interpretation=lot of ops, intuitive tech skills, wealth of ideas from own needs)

- **Student pilot study**
  The conclusion from this study which involved designing prototypes with private households (not referenced in this paper) was that families with young children are very creative – have 'design energy'.

- **Attitudes towards product target (electricity consumption) from consumer behaviour lit**
  From other researchers (not defined in this paper)

The outcome of this was a screening questionnaire (which included the attitude screening questions). See page 325 for detail of 6 answer options. Families were asked to imagine their response if asked to be involved in study to develop future homes. If they answered yes to option 2 (we will most likely say yes

because we think that it could be fun and exciting or option 4 'we will most likely say yes to participate because we don't know so much about the subject but like to participate and learn more about the subject.

The recruiting strategy was through chairs of political parties in Denmark to members of the parties. The assumption was that if you are a member you are interested in issues such as electricity consumption. TR – this seems a rather groundless assumption.

8 families were recruited including 6 with young children (the latter confirmed the findings of the student pilot study re design energy)

The main conclusion was that 'people openly interested in re-arranging their environment and its technology, and not 'stuck; with too much experience, make excellent innovators' and 'those who are most suited to rearrange their environment are those who can, those who take a pleasure in doing so, and those who get the opportunity'.

SUMMARY

Their traditional sampling criteria for 'innovators' were:

- Probably not future users but brought in because they 'represent the web of relationships between user and product as quoted by Margolin' 1995 <ref 31>
- They represent the product context (tacit knowledge).
- They represent Rogers <ref 35> 'vast majority' with respect to attitudes to technology.

Their new criteria were based on **Thomke & von Hippel (2002)** (for which they developed a screening questionnaire see p325) i.e. customers:

- with needs
- with engineering skills
- with little experience with traditional development (i.e. not 'stuck' in too much experience and traditional thinking.

Plus

- families with young children (identified as creative by a pilot study, not referenced)

The area of innovation was a device to reduce energy consumption in the home – product/service.

Follow-up

- Thomke & von Hippel, 2002 paper re characteristics
- Any future papers on the FEEDBACK project or by same authors

Their study focused on the development of telecoms services (particularly ideas for an SMS-to-Internet service). The main thrust of the research was to find out, experimentally, whether there was a difference between the quality of innovative ideas generated by 3 different groups

- Professional
- Users (working alone)
- Users who could consult professional re feasibility and whether the idea was new (but the professionals could not contribute ideas back)

Quality was measured based on originality, user value and producibility (variables determined by 5 experts in mobile telephony service development). The assessment of ideas used the Consensual Assessment Technique (CAT) (Amabile, 1996) – six experts, experienced in evaluating mobile communication service ideas ranked on a scale of 1 to 10.

They also state that there are few examples of engaging users in innovation for <u>service</u> design and that most research has been on tangible products and industrial markets.

They discuss the background literature and, as well as evidence of the benefits of engaging with users to generate innovations they also identified where limitations had been identified. The key ones were:

- 'First, perception is limited to what consumers can currently relate to. Second the consumers' ability to express and verbalize their needs is limited because they do not know what is technically feasible. Third, the needs expressed by consumers may well have changed by the time the new products is developed and ready' (Bennett and Cooper, 1981, their ref)
- '"Stay close to your customers" might mislead suppliers into avoiding exploration of the opportunities provided by new disruptive technologies.' (Christensen & Bower, 1996, their ref)
- '..users lack sufficient technical knowledge to produce innovations and are unable to articulate their needs.' '..customers can be "widely unimaginative" and must be ignored in order to enable the creation of breakthrough products and services.' (Leonard & Rayport, 1997, their ref)
- 'The list of items initially rejected by customers is long..' (Martin & Faircloth, 1995, their ref)

The assignment given to the users was 'generating useful ideas for new SMS-based services'. It is not made clear how this was put to the users, i.e. whether it was a problem-solving focus. However there is description of a demonstration of potential services to their users and that the exercise lasted 12 days of them trying out various ideas within their daily life (which allowed immersion in contexts and reflection on ideas).

The users that were involved were 'ordinary users who were students.. volunteering their services'. The students were in non-technical; study programmes. 'The main reason fro choosing students was that they represent one of the most frequent SMS user groups, thus representing user well'. Data was gathered on the users but was not used for selection or for assigning them to groups (which was randomly done). The data was:

- Age

- Experience of mobile telephony

- SMS usage

- Creativity (ES-test, Holmquist & Ekvall, 1986)

- Positive or negative disposition (Life Orientation test, Scheir & Carver, 1985)

- Technology readiness (Parasuraman, 2000)

The main results were:

- Originality – ordinary users best (consulting users & professional last) - significant

- User value – ordinary and consulting user best (professionals last) - significant

- Producibility – consulting users and professionals best (ordinary users last) – not significant

- (also ordinary users contributed more ideas than consulting users

Main discussion points

- Consulting users originality stifled by expert judgement of feasibility – users adopted experts more rigid way of thinking, became 'expert copycats', found it difficult to hold on to 'crazy, odd or totally new' ideas if told it wasn't feasible.

- Consultation also meant that users and company experts were now not anonymous (to each other) and therefore users shifted their focus to value to company rather than value to users.

- But some technical knowledge is necessary to trigger the innovation process and get it on track (von Hippel, 2001, their ref).

- A side benefit was that the company experts realised how little they knew of user needs and wants.

- The experts found it difficult not to contribute (even better) ideas back when a user idea trigger their thought processes.

Their conclusion re next steps:

- The findings must be validated in other contexts.

- Various ways of involving user should be compared.

- More assessment criteria should be identified and investigated.

- Longitudinal studies should be performed to investigate impact on final service.

SUMMARY

Sampling criteria were:

- 'ordinary users who were students.. volunteering their services'

- in non-technical; study programmes

- represent one of the most frequent SMS user groups.

Other data was gathered but not used for selection or for assigning them to groups:

- Age

- Experience of mobile telephony

- SMS usage

- Creativity (ES-test, Holmquist & Ekvall, 1986)

- Positive or negative disposition (Life Orientation test, Scheir & Carver, 1985)

- Technology readiness (Parasuraman, 2000)

Results were:

Ordinary users – Originality YES, User value YES, producibility NO

Consulting users - Originality NO, User value YES, producibility YES

Professionals - Originality NO, User value NO, producibility YES

(note: consulting users – benefit of 'educating' professional re user needs; plus inspired ideas in professionals, but in this study they couldn't share them)

Follow-up

- The CAT technique for agreeing assessment criteria (Amabile, 1996)

- Literature on limitations of ideas generated by users: (Bennett and Cooper, 1981); (Christensen & Bower, 1996); (Leonard & Rayport, 1997); (Martin & Faircloth, 1995)

- Other tests for users: Creativity (ES-test, Holmquist & Ekvall, 1986); Positive or negative disposition (Life Orientation test, Scheir & Carver, 1985); Technology readiness (Parasuraman, 2000)

Matthing, Kristensson, Gustafsson, Parasuraman – Journal of Services Marketing 2006

The application domain is the development of technology-based services.

2 studies using the **Technology Readiness** construct proposed by Parasuraman (2000) which 'specifically addresses and incorporates the underlying paradoxical attitudes that individuals seem to experience when exposed to new technology'. Their technology focus was computer and internet-related services in U.S.

It is operationalised by Parasuraman as:

Technology Readiness Index (TRI)

36 statements, grouped into

1. 2 enabler dimensions, optimism and innovativeness

2. 2 inhibitor dimensions – discomfort and insecurity

Has been shown to have strong psychometric properties

If high on (1) and low on (2) – likely to be a lead users of new technologies

Parasuraman & Colby (2001) identify 5 distinct customer segments (in decreasing order of adoption propensity):

- Explorers

- Pioneers

- Sceptics

- Paranoids

- Laggards

Study 1 – Technology Readiness is positively correlated with:

Hyp 1 – adoption of new technology-based services

Hyp 2 – propensity to actively seek new technologies and solve problems related to them

Hyp 3 – willingness to participate in the process of new technology-based service development

Re Hyp 3, in industrial or business-to-business contexts there is an economic incentive (Prahald & Ramaswamy, 2000; Chesborough, 2003); the extent to which end users are willing and motivated to participate is an open question (von Krogh, 2003)

Sample was 1004 respondents to Swedish National Technology Readiness Survey which had 3 parts:

1. 36-item TRI scale

2. questions focussing on attitudes and behaviours related to technology-based services and products; plus willingness to participate in new service development

3. background and demographics

Hyp 2 and 3 of most interest here:

Hyp 2

TRI positively and significantly correlated with scores on 4 statements 5-point Likert scale)

1. You enjoy thinking about novel technology-based services and solutions

2. You often come up with new solutions to problems you experience with new technology

3. You enjoy findings solutions to problems that accompany new technology

4. You actively search fro updates and launches of new technology-based services

Hyp 2

Response 'yes' to 'willingness to participate'

Mean TRI for the 35% 'yes' was 3.03; for the 65% 'No' was 2.63

% 'yes in each group

- Explorers 64%

- Pioneers 41%

- Sceptics 28%

- Paranoids 23%

- Laggards 15%

Study 2

Hyp 4 – TR is positively correlated with creativity in terms of both quantity and quality of innovative ideas generated.

52 students given GSM phones plus a platform for new services e.g. mobile internet. Task – generate services for value-adding mobile phone services (i.e. should provide benefits and functions in their own specific environments) and, when possible, creating (programming) ready prototypes. 'Idea-generation' lasted for 12 days – ideas logged in diaries. 'Termination' phase required transcription of ideas into more detailed service descriptions/

Due to time constraints replaced TRI with TRQuotient (Parasuraman & Colby, 2001, p25-6) – 5 positive and 5 negative items about technology, resulting in TRQ of -20 to +20.

Creativity assessed based on 'creative performance' construct (Im & Workman, 2004) which consists of 3 dimensions derived from creativity literature:

- Fluency – number of ideas generated

- Flexibility – number of different categories of idea generated

- Originality – qualitative – a person's ability to think or truly novel ideas (measured using Consensual Assessment Technique (CAT) derived from Amabile (1996) and used panels of judges rating originality from 1 to 10

Sample split into high TRQ n=26 (+6 to+16), and low 2n=6 TRQ (-9 to +5)

t-tests showed significant difference (at 0.01 or 0.05) between 2 groups on all 3 dimensions, supporting Hyp 4

Background lit on customer involvement

- Empirical research shows that companies' intensified interaction with customers will improve the effectiveness of new service development – Alam, 2002; Magnusson et al 2003; Olson & bake, 2001' Thomke, 2003;

- But the challenge is the identification of innovative customers who are likely to be most helpful (Goldsmith & Flynn, 1992; Parasuraman & Colby, 2001; Rogers, 1995; von Hippel, 1985)

- 'Lead users are skilled at predicting future conditions and also have strong needs for solving their present problems' (Olson & Bakke, 2001; von Hippel, 1978, 1986, 1988; Thomke & von Hippel, 2002)

- Lead users are not the same as 'innovators' (Rogers, 19095). 'Diffusion theory focuses on identifying and understanding different customer categories that are formed based on the timing of adoption'… 'it is of limited use in terms of providing insights during the new product or service development process, prior to full-scale market introduction'.

- Previous lead user research has focussed on business-to-business contexts involving industrial goods (Pitta & Franzak, 19996) perhaps because lead user s can be easily and reliably identified in those context than in consumer goods (von Hippel, 1986).

- It has suggested that lead users in both contexts have similar characteristics – a strong, well-developed set of needs and a willingness to participate in fulfilling those needs (e.g. Morrison et al, 2000). Thus using the industrial context as a start point it would be useful to develop a process for identifying lead users for new servicer development (Marin & Horne, 1995; Slater, 2001)

- Any approach tends to take into account the complex nature of consumer attitudes and behaviour. References include TAM (Davis, 1989); TAM adaptation for online consumer behaviour (Kopufaris, 2002); positive & negative feeling towards technology (Mick & Fournier, 1998); intention to use self-service technologies is driven by multiple, hierarchical attitudes (Curran et al, 2003).

Discussion

The ability of high TR users to think in novel ways is perhaps explained by their curiosity and advanced needs - Parasuraman & Colby (2001) state 'the highly techno-ready consumer will instinctively try to solve the problem alone' which is one of the characteristics of lead users in industrial contexts (von Hippel, 1986).

Te willingness of high TR customers to participates is consistent with Prahalad & Ramaswamy's (2000) contentions that certain customers are very excited about being a source for companies seeking to develop new products/services.

Will resultant services appeal to lower-TR customers who enter the market later? (Moore, 1991)

What incentives are most fruitful for user involvement?

- Praise fees, early access to the products they have helped create (Pitta & Franzak, 1996)

- Social comparison (Hertel et al, 2003) in open-source software development

- Intrinsic motivation (Amabile, 1996)

Low number of users might be sufficient – 26 high-TR in Study 2. Authors suggest starting with 10 to 20 and increasing if insufficient number/diversity of ideas.

SUMMARY

Technology Readiness correlates with:

- adoption of new technology-based services

- propensity to actively seek new technologies and solve problems related to them

- willingness to participate in the process of new technology-based service development

- Creativity in terms of both quantity and quality of innovative ideas generated.

Follow-up

Refs

- TRI/TRQ - Parasuraman & Colby (2001); Parasuraman (2000)

- End users willingness to participate - von Krogh, 2003

- Consensual assessment technique - Amabile (1996)

- Identification of innovative customers who are likely to be most helpful - Goldsmith & Flynn, 1992; Parasuraman & Colby, 2001; Rogers, 1995; von Hippel, 1985

- 'Lead users are skilled at predicting future conditions and also have strong needs for solving their present problems' - Olson & Bakke, 2001; von Hippel, 1978, 1986, 1988; Thomke & von Hippel, 2002

- Identifying lead users - Morrison et al, 2000; Marin & Horne, 1995; Slater, 2001

Other work by same authors

Mulvenna, Galbraith, Martin, 2009

'TRAIL represents a developing Public-Private Partnership (PPP) where companies, public authorities and communities work together creating, prototyping, validating and testing new service, businesses, markets and technologies in real-life cont6exts in the regions, rural areas and virtual spaces between public and private players in the region in the North of Ireland'

It is part of the European network of Living Labs (ENOLL) which number over 100, accounting for a network of more than 70 million end users

It states that it is based in the lead user method and that there is a paucity of this research in the health and wellbeing domain (the focus of TRAIL), i.e. previous lead-user research has been in specific industrial

sectors such as leisure, customised goods and manufacturing. However, the application of the lead user approach is not discussed in any great detail as this is an overview paper.

'TRAIL has also sought to incorporate some aspects of Innovation Space models <24>, which cater for a more complex knowledge transfer and innovation model, making the user a critical actor in the process and focussing the process on delivering user-tested innovation'

They state they have taken 3 'lead user' approaches:

- the traditional lead user

- proxy lead user (e.g. a carer of someone with dementia)

- the lead user dyad (user and proxy lead user)

SUMMARY

No 'operationalisation' of lead users but a suggestion that this may have taken place in some of the studies (this paper only provides a high-level overview.

Follow-up

- The living labs approach may have some merit in our research – look for other papers reporting these

- The concept of lead user, proxy lead user and lead user dyad may be of interest

- Innovation Space models may also be worth looking at further <24>