

Early user involvement in research and design projects – A review of methods and practices

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Paper for the 23rd EGOS Colloquium (European Group for Organizational Studies)

July 5–7, 2007, Vienna

Theme 25: Dancing with users: How to organize innovation with consumers and users?

Abstract: We describe methods and practices of early user involvement and human-centred design: how researchers and designers, in the ICT industry, attempt to cooperate with end-users, with the goal of making a better match with end-users' needs and preferences. We describe six (dance) moves: participatory design, ethnographic fieldwork, lead-user approach, contextual design, co-designing, and empathic design. We focus on whose knowledge (of researchers/designers or of end-users), and which kind of knowledge (about the present or about the future) is privileged. We discuss which method or which practice would be most appropriate for which kind of project, or for which goal.

Introduction

Innovation is necessary for many organisations. Not innovation for its own sake, but innovation as a means to create new products, services or systems ¹. This will in turn help to create added value for end-users: the people that will actually use these products, services or systems. The ambition to create innovations with added value for end-users

is especially – but not exclusively – problematic in the ICT industry, where innovations are often driven by technology push. In the ICT industry, there is the risk that researchers and designers invent something that only a few people need, want to use, or are able to use. There seems to be a gap between the world of researchers and designers on the one side, and the world of end-users and customers on the other side (Muller 2002). We are interested in attempts which aim to bridge this gap.

We propose to use the term ‘human-centred design’ (HCD) to refer to such attempts of researchers and designers to interact with end-users constructively in their innovation projects. HCD can be defined by four characteristics: 1) the active involvement of users for a clear understanding of user and task requirements; 2) an appropriate allocation of functions between users and technology; 3) iteration of design and evaluation processes; and 4) a multi-disciplinary approach (ISO/IEC 1999). We are mostly interested in the first characteristic.

Pros and cons of user involvement

HCD can be seen as a constructive combination of market research and product development, because it brings future or possible end-users into the development process. This can solve a key problem in innovation, which is that too many projects suffer from ‘insufficient market input, a failure to build in the voice of the customer, and a lack of understanding of the market place’ (Cooper 1999). Furthermore, it has been noted that lack of adequate market research is a key factor of failure of innovations (Panne et al. 2003), resulting in, for example, a problematic translation of engineers’ desires into customer’s needs. User involvement is seen as a way to obtain valuable input from end-users. Kujala (2003), in a review of methods and practices, concludes that involving end-users in research and design activities (in projects in which ICT products are developed) can have diverse positive effects: on the quality or speed of the research and design process; on a better match between a product and end-users’ needs or preferences; and on end-users’ satisfaction (Kujala 2003).

However, Panne et al. (2003) also observe that it remains controversial to involve consumers into the innovation process: they argue that innovators can become prejudiced about customers’ needs when they involve customers more regularly, and

that user involvement can bias innovators towards imitative innovations, as customers express their preferences in terms of products that they are already familiar with. Furthermore, there are some caveats for user involvement. Van Kleef et al. (2005) mention three reasons to be careful in relying on end-users' utterances: end-users may not be aware of their needs; they may not be able to articulate their needs; and they may not be willing to speak about their needs with an interviewer. In addition, Stewart and Williams (2005) warn for over-emphasizing the findings from a study with a few end-users because such a study may result in an over-customized product that will interest only a few. Finally, Hekkert and Van Dijk (2001) argue that paying too much attention to end-users may erode the role of the designer, whose vision and creativity are essential for innovation. In more general terms it has been suggested that end-users would not be able to speak reliably about their future needs or about future products.

Although we are aware of these controversies, limitations and caveats, we remain interested in researchers' and designers' attempts to constructively interact with end-users. The idea that users can and should play a role in innovation can be related to the idea that users are *already* and *actively* playing diverse roles in innovation processes. This idea is well developed in the field of science and technology studies, in which innovation is seen as a process of 'co-construction' (Oudshoorn and Pinch 2003): researchers, designers *and* end-users are all active participants in the shaping of an innovation: what a product will look like and what people do with it.

We believe that it can be constructive to involve end-users in research and design processes because of different possible benefits. These advantages range from political, via economic, to practical benefits. It can be a political benefit if end-users have a say in the process of research and design. User involvement can have an economic advantage when end-users provide input that helps to save money or time. And it can be a practical advantage when researchers or designers invent more creative products together with end-users. (We will come back to these three types of benefits later on.)

Research question and focus

There are many different methods for HCD. This wide variety means that one must select a method (or a mix of methods) from this broad range. Unfortunately, information

is lacking about which method or practice is most appropriate for which kind of project, or for which goal. Therefore, we will focus on this question: *Which methods or practices can be applied for which kind of project, and for which goals?*²

Our goal is to provide *descriptions* of methods/practices, and to systematically compare between these methods/practices. We do *not* intend to *prescribe* specific methods or practices, or to prove that certain methods or certain practices are more successful than others³, nor is it our goal to study the reliability of end-users' utterances, or the success of the products which result from human-centred design.

We focus on *early* user involvement, on attempts to involve end-users in the 'fuzzy front end of innovation' (Koen et al. 2002). The fuzzy front end are the early stages of a project, in which problems and opportunities, ideas and concepts are explored and articulated. These stages are quite different from later stages of development, prototyping and implementation (e.g. Akrich et al. 2002). We chose this focus because user involvement is increasingly common in the later phases, when, for example, end-users are invited to test the usability of a product. However, it is less common to involve end-users in the early phases, for example, to participate in the problem definition at the start of a project. Moreover, *if* user involvement occurs in these early phases, it is often in an experimental or academic setting, rather than in mainstream or industrial settings.

Furthermore, we focus on projects in which ICT products are being developed, and on involvement of user in research or design activities⁴.

In the next section we explain our interest in the role of knowledge in human-centred design, and how we will use this concept in our categorization of methods and practices. In the section after that we describe six methods and provide some examples of practices, based on a literature review. In the last section we provide insight in what method or practice is appropriate for which kind of kind of project, or for which goal.

The role of knowledge

We propose to look at HCD through the lens of 'knowledge'. With 'knowledge' we refer to a wide range of concepts: knowledge of an end-user about her practice;

knowledge of a researcher about some end-users' practice; knowledge of a designer about technology; an end-user's ideas for product improvement; a researcher's hunch about a certain problem; a designer's ambition to create something; etcetera. This focus on knowledge can also be justified by the claim that knowledge is already at the heart of two assumptions underneath HCD: we assume that end-users have knowledge about some practice, that researchers and designers have their knowledge, and that they can share knowledge and jointly create new knowledge, make design decisions, which result in a new product.

We wish to raise two questions concerning the role of knowledge in HCD:

- *Whose* knowledge is privileged? This question is about the roles of researchers/-designers and of end-users. For example: Who initiates the project? If end-users initiate a project, their knowledge is leading: end-users move, with their knowledge, towards research and design activities. On the other hand, if researchers/designers initiate a project, their knowledge is leading and steers the way they interact with end-users. This question is also about communication and interaction between researchers/designers and end-users. Researchers can explicate end-users' knowledge and transfer it to designers. Designers and end-users can share knowledge, learn mutually, and jointly design. Or end-users can be invited to merely validate researchers' findings and designers' solutions. One can envision a continuum of 'pro active user involvement' versus 'reactive user involvement' (Limonard and de Koning 2005).
- *Which* knowledge is privileged? This question is about what kind of knowledge is the starting point for a project and about the role of this knowledge in the process of product design, in how an idea is transformed into a product. A project can start with ideas about a current situation, often depicted as problematic, an 'is' situation ('present socio-technical context of use' (Limonard and de Koning 2005). Or it may start with ideas about some future situation, often depicted as an opportunity, an 'ought' situation ('future use of a technology in context'; *ibidem*). These different starting points are crucial for how research and design proceed.

Human-centred design moves

In our review we aim to both have a specific focus ⁵, and to include a wide variety of methods/practices at the same time. We focused on methods/practices which occur in the early stages of product development, but not necessarily *exclusively* in the early stages. Furthermore, we tried to draw from a wide range of traditions, which is different from reviews which focus on one kind of method or practice, e.g. on participatory design or on the lead-user approach. We drew from various reviews (Muller and Kuhn 1993; Kaulio 1998; Aldersey-Williams et al. 1999; Friedman and Kahn 2002; Muller 2002; Kujala 2003; Koskinen and Battarbee 2003; van Kleef et al. 2005; Spinuzzi 2005; Törpel 2005; Sanders 2006).

We describe these methods and practices as *separate* and *stereotypical* moves. We do this for the sake of argument, and we are well aware that in reality these moves are often combined (instead of being separate), and that moves are adopted and performed differently in different settings (instead of being stereotypes). In projects one may very well combine several moves. In the next sections we describe six human-centred design moves, which can be seen as dance moves.

Participatory design

The move of participatory design (Schuler and Namioka 1993; Muller and Kuhn 1993) is of end-users towards, and into, the research and design process. Participatory design has its roots in the 1970's in Scandinavia, and was initiated by trade unions who saw offices becoming automated by computers, and strived for more democratic values in the work place and for workers' emancipation. Participatory design is about providing people who will be using a system a voice in the process of design, evaluation and implementation of a system which they will be using. 'It attempts to examine the tacit, invisible aspects of human activity [and] assumes that these aspects can be productively and ethically examined through design partnerships with [end-users]' (Spinuzzi 2005).

In participatory design, end-users are treated as experts – often experts in doing some specific work – and it is attempted to bring their knowledge and their skills (tacit knowledge) into the development process. End-users' knowledge about their current

practice is privileged. The goal is to let end-users and designers jointly create a tool with which the end-user can do her work better. 'The tool perspective allowed researchers to recognize and leverage the workers' craft knowledge' (Spinuzzi 2005). The goal is 'mutual learning'. For instance in a study of Ehn (1993), graphics workers learned about the technical possibilities and constraints of computer technology, while designers learned about the craft and profession of the graphics workers. This may sound idealistic, and it is important to keep in mind that participatory design 'raises questions of democracy, power, and control at the workplace. In this sense it is a deeply controversial issue, especially from a management point of view' (Ehn 1993).

A classical example of participatory design is the UTOPIA project (Ehn 1993), initiated in 1981 as a cooperation between the Nordic Graphic Workers' Union and researchers in Sweden and Denmark. In this project workers were invited to workshops in which they could explore problems and develop solutions, together with and supported by researchers and designers. In this project a workshop format was developed and applied: a 'Future Workshop' (Bødker et al. 1993), which consists of three phases: 1) Critique – a kind of brainstorm in which all participants are able to speak up; 2) Fantasy – in which themes from the Critique-phase are inverted to positive guiding themes and elaborated into 'utopian outlines'; and 3) Implementation – a phase in which practical plans are articulated to start acting in the immediate future.

Ethnographic fieldwork

There is a tradition of conducting fieldwork – applied social science, inspired by ethnography or ethnomethodology – in order to inform or inspire product development. The ethnographic move is about researchers and designers going 'into the field' – often to work places – to better understand people via observations and interviews. The ethnographic move is meant to be descriptive (rather than prescriptive) and to foreground and emancipate the end-users' perspective. Such studies are often done for the (re)design and evaluation of ICT applications for computer supported cooperative work (CSCW) (Button 2000; Crabtree 2003). These kinds of studies focus upon social and cultural aspects of communication and cooperation – which can be seen as a

reaction to studies which focus on people as individuals, and on people's functional and cognitive aspects.

In many projects ethnographic work and participatory design are combined (Kensing and Blomberg 1998), e.g. in all sorts of workshops. However, if we artificially isolate the ethnographic move from participatory design move, we see researchers and designers who study end-users via observations and interviews. They gather knowledge *about* end-users and end-users' *current* practice, and this knowledge – the researchers' and designers' understanding and representation of end-users – is privileged to the ethnographic move. In contradiction to the participatory move in which end-user's going 'towards the lab', the ethnographic move is about researchers and designers going 'into the field'.

The ethnographic move challenges researchers and designers to look at a situation through the eyes of end-users. The goal is to look at naturally occurring situations and to look at these 'holistically' and from a 'members' point of view' (Blomberg et al. 1993). Holistically means that the researcher/designer looks at particular behaviours of the end-users in relation to how they are embedded in their social and historic fabric of everyday life. The 'members' point of view' refers to an interest in end-users processes of creating meaning, and is about end-users' descriptive categories. For example describing a copier as the 'only copier that will handle my oversized originals', rather than applying categories from the world of research/design, for example 'Canon NP9800 copier' (Blomberg et al. 1993).

Contextual design

In contextual design (Beyer and Holzblatt 1998) the ethnographic move complemented with a move into the design process. It is a technique to help researchers and designers observe people doing tasks in their natural context (often a work context) and then to apply pragmatically their findings in the design of a system (often an ICT application). After that, these observations are interpreted by a multi-disciplinary team and the findings are directly applied to the articulation of functional requirements for a system to be developed. The observations are clustered along different perspectives, such as:

what end-users do; how they communicate; the roles that power and culture play; the artefacts which they use; the physical environment in which activities take place.

In contextual design knowledge about end-users is gathered by the project team members. This knowledge is then brought into the development process where it is transformed into product requirements. Because of the systematic way of doing the observations, interpreting and feeding the results into the development process, we can say that the project team members' knowledge *about* end-users (which is of course based on interactions *with* end-users) is privileged over knowledge *of* end-users. The technique's explicit goal is to transform knowledge about a present situation into knowledge (specifications) about a future situation (with this new system).

One example is the development of a system for the company LANDesk (the example comes from Incontext, www.incent.com). LANDesk provides security management solutions, and they wished to gather reliable customer data quickly (within four weeks) in order to improve their product and increase market share. By observing and interviewing different users performing a variety of tasks, the design team was able to better understand their needs. The team also participated in interpretive sessions, lending its expertise to the data analysis. This delivered a market characterization and detailed design recommendations and revealed opportunities to improve the product.

Lead user approach

Many ideas for new products originate in the heads and hands of innovative end-users or 'lead users' (Von Hippel 1988; Von Hippel et al. 1999; Von Hippel 2005). Lead users are users who have 'two distinguishing characteristics: (1) They are at the leading edge of an important market trend(s), and so are currently experiencing needs that will later be experienced by many users in that market. (2) They anticipate relatively high benefits from obtaining a solution to their needs, and so may innovate.' (Von Hippel 2005, p. 22). Lead users experience a problem or need which they cannot fulfil with a current product and create innovative solutions, applications or modifications. Lead users can be invited to help researchers and designers to jointly develop improvements to existing products or to develop new products. An important difference with

participatory design is that the lead user approach is oriented towards pragmatic and commercial goals (rather than towards democracy or emancipation).

In the lead user approach end-users' knowledge and skills regarding some future product is privileged. The movement is of end-users bringing innovative knowledge, knowledge about a future situation, into the development process. Interestingly, in the development of outdoor or extreme sports equipment, lead users are sometimes hired by the firm, and product managers are often passionate user of such products (Hamm 2006). The roles of end-user and researcher/designer are then mixed.

The rise of 'Web 2.0' has enabled new ways to apply the lead user approach: innovation by members of virtual communities, 'user innovation networks', 'peer production', 'community driven innovation' or 'crowdsourcing' (Howe 2006). Cambrian House (www.cambrianhouse.com) is one of the first organizations to elaborate and exploit this concept. Members of its community can foster new software ideas that target a mass market, and can be bought, sold, and distributed over the Internet. A community member can submit an idea and if many members vote in favour of this idea, it is rewarded with \$10.000 to be used to further develop the idea. In the Cambrian House the distinction between researchers/designer and users/customers is fuzzy. Community members act as both: when submitting an idea and developing the ideas of themselves or other community members, they act as designers; when reacting on and voting for the ideas of others, they act as users/customers.

Empathic design

The basis movement of empathic design is that of researchers and designers moving towards end-users, of trying to get closer to their live and work, of trying to empathise with them, with their experience and emotions. There are different versions of empathic design, varying from a business-like approach (Leonard and Rayport 1997) to a more creativity-like approach (Koskinen and Battarbee 2003). There is a broad variety of techniques, which are often combined in one project, for example: observing (or 'shadowing') potential end-users or via role-playing parts of potential end-users' lives (Aldersey-Williams et al. 1999; Iacucci et al. 2000; Iacucci and Kuutti 2002; Oulasvirta et al. 2003; Svanaes and Seland 2004). The goal of empathising on an emotional level

with somebody else can be (slightly) different from *describing* another person in more detached terms as is done in (traditional) ethnography.

The researchers' and designers' knowledge – or better: *experience* – is privileged in empathic design. Although they go towards end-users and interact with them, it is the researchers and designers who attempt to experience something. Empathic design is about attempts to find inspiration in the end-users' practice and to fuel creativity by empathising with end-users. Since inspiration and creativity are key, we can say that knowledge – ideas – about some future product are privileged.

One design project (Iacucci et al. 2000) may serve as an illustration. In this project the designers wished to capture the socio-cultural aspects and project them into a future situation to develop product ideas. At the same time, several potential end-users had to try to articulate feedback to presented non-yet-existing future products. Because of the difficulty of envisioning and talking about future products the project team members chose to keep the design-evaluation short and to make several iterations. Furthermore, the project team members applied 'Situated and Participative Enactment of Scenarios'. The designer 'shadowed' an end-user during one or two days and used a digital camera and a diary to record activities, and the end-user was invited to carry around a simple mock-up which represents the future device. This 'magic thing' is meant to help envision and enact use scenarios, which can come from the designer or the end-user. Such scenarios were always acted-out in a dialogue between the designer and the end-user, which helped to discuss possible features of this future product.

Co-designing

In co-designing (Sanders 2000; Sanders 2002) or co-creation potential or future end-users are invited, together with researchers and designers, for all sorts of workshops, and they are provided with tools to jointly *create*. The focus is on jointly articulating ideas, on playing with concepts, on making and evaluating sketches, on jointly tinkering with mock-ups and prototypes. Sanders (2000) distinguishes between three approaches: 'what people say' in marketing research, 'what people do' in applied ethnography, and 'what people make' in participatory design.

Knowledge of end-users and knowledge of researchers and designers are brought together, similar to participatory design, with the goal of creating knowledge about some future and desirable situation and products. Ideas about this future situation and this future product are privileged. Co-designing can be thought of as a mixture of participatory design and empathic design.

Co-designing is also known as the application of ‘generative tools’, which ‘refers to the creation of a shared design language that designers/researchers and the stakeholders use to communicate visually and directly with each other. The design language is generative in the sense that with it, people can express an infinite number of ideas (e.g., dreams, insights, opportunities, etc.) through a limited set of stimulus items’ (Sanders 2006). In this approach end-users and designers are provided with all sorts of material via which they can express themselves, for example ‘tools for remembering’, diary-style cards on which people can answer a question like ‘What is your typical weekday evening like?’; ‘tools for thinking’, which help e.g. during brainstorming about; ‘tools for mapping’, diagrams to help create solutions; ‘tools for visioning’, which are meant to help envision what a future situation may look like; or ‘tools for feeling’, which are meant to express emotions (Sanders 2000). In addition tools are applied to facilitate communication within a project team, to ‘support inspiration, empathy and engagement’ with end-users (Sleeswijk Visser et al. 2007).

Drawing a human-centred design space

We can plot these human-centred design moves reviewed above into a space, in order to provide an overview and to discuss the differences between these methods/practices.

We draw a space along two dimensions, see Figure 1. The horizontal dimension is about an emphasis on end-users’ knowledge and their move towards research and design activities versus an emphasis on researchers’ and designers’ knowledge and their move towards end-uses. The vertical dimension is about an emphasis on a current situation (‘is’) or on a problem versus an emphasis on a future situation (‘ought’) or on an opportunity. This vertical dimension also draws attention to three (underlying) values: 1) a move towards democracy and emancipation in participatory design and ethnographic fieldwork; 2) a move towards pragmatic and commercial application in the

lead user approach and contextual design; and 3) a move towards creativity and inspiration in co-designing and empathic design.

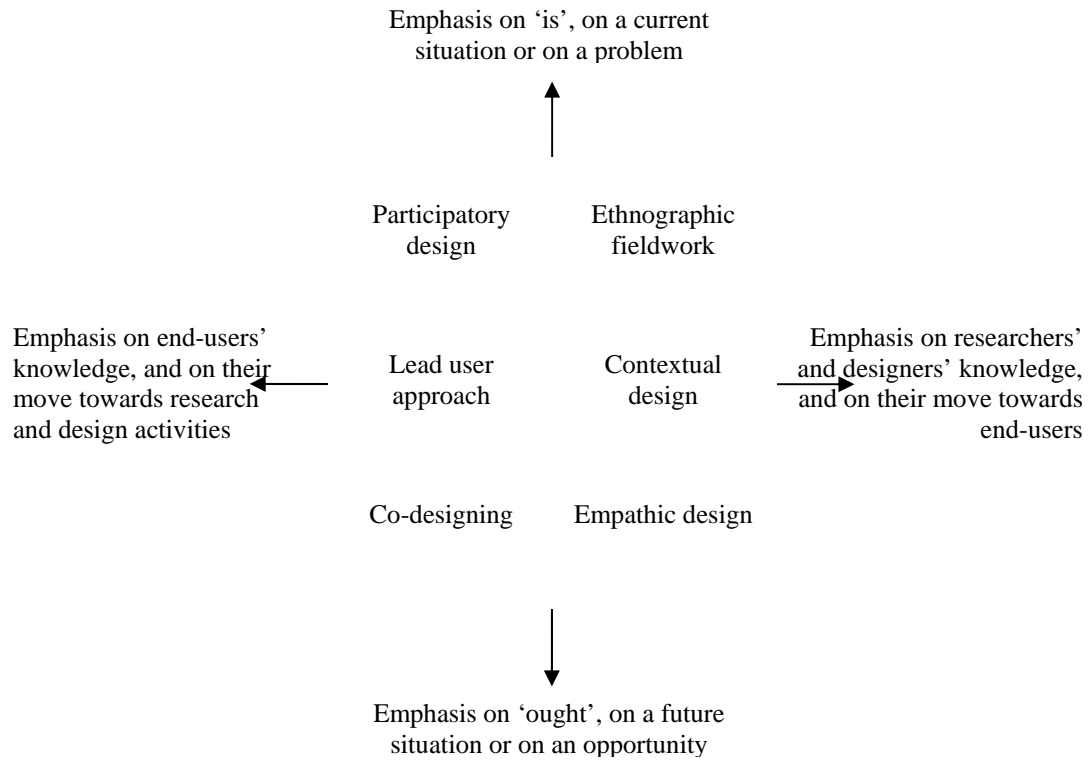


Figure 1. Different human-centred design methods and practices

Our horizontal axis is similar to axes used by other authors who also developed grids to distinguish between methods: 'Who participates with whom in what: Users directly participate in design activities vs. Designers participate in users' world(s)' (Muller and Kuhn 1993), 'Type of customer involvement: Design by; Design with; Design for' (Kaulio 1998), and 'Participatory mindset ('users' seen as partners, active co-creation) vs. Expert mindset ('users' seen as subjects, reactive informers)' (Sanders 2006). Furthermore, our vertical axis is similar to the axes 'Research-led vs. Design-led' (Sanders 2006), 'User centred vs. Designer centred' (Aldersey-Williams et al. 1999) and 'User-centred design v. Designer-centred design' (Koskinen and Battarbee 2003).

Whose knowledge

Although all of these methods are meant to foreground and apply end-users' knowledge, there are differences between these methods in whose knowledge is leading and how knowledge is transferred. In participatory design, lead user approach and co-designing the end-users, with their knowledge, move towards the researcher and design process, whereas in ethnographic fieldwork, contextual design and empathic design researchers and designers, with their knowledge, move towards end-users.

In participatory design end-users articulate a problem in their current situation and researchers/designers try to solve that problem together with them. In ethnographic fieldwork the researcher/designer moves towards the end-users by interviewing and observing them in their current work situation. Both moves aim to get insight in a current situation of end-users or to solve a current problem for them.

In the lead user approach an end-user initiates the process: he or she develops an idea or a product and then moves towards researchers and designers to further develop that idea or product. In contextual design researchers and designers go end-users to observe and interview them, and do a workshop together, and then they apply their findings in the design process. In both moves the knowledge of researchers/designers and of end-users is pragmatically and rapidly combined to create practical results.

In co-designing the end-users move towards the researchers/designers to jointly and creatively explore and envision future situations or future products. In empathic design the researcher tries to get closer to an end-user and his or her experiences, by emotionally empathising with them. In both moves the knowledge of researchers or designers, their ideas and experiences, have a relatively prominent role (next to end-users' ideas and experiences, of course).

Furthermore, we see that communication is relatively intimate in participatory design, the lead user approach, and co-designing: end-users are invited and allowed to participate hands-on in research and design activities. The way knowledge is shared in ethnographic fieldwork and contextual design is more at arms length: knowledge *about* end-users (rather than *from* them) is generated and transferred into the design process. Furthermore, in empathic design a researcher/designer tries to generate knowledge about end-users by personally empathising with them.

Which knowledge

In ethnographic fieldwork and participatory design knowledge about a current situation and practice is foregrounded: such projects typically focus on a certain group of people who are working on a certain task. The goal is to study a current practice, and to articulate problems and develop solutions for that practice. These methods/practices can be applied both for evaluation of products, and for the (re)design of (new) products.

Conversely, in co-designing and empathic design knowledge, ideas and ambitions about a future situation and practice are foregrounded. These methods/practices can have an idea for a future or innovative technology as a starting point, and then move towards imagining possible futures, with the goal of creating a (really) new product. This can be a mild form of technology push. This can be done people who are not a group working on a specific task. Having an idea for a future technology as starting point is different from having a current situation or practice as a starting point.

Contextual design and the lead user approach can be seen as attempts to pragmatically mix different kinds of knowledge: ‘ist’ and ‘ought’. In contextual design the researchers and designers combine a rapid ethnographic-like move of understanding the *current* situation via observations and interviews, and a quick empathic design-like move of applying this understanding of end-users in articulating design specifications for a *future* product. Furthermore, in the lead user approach the lead users have knowledge about a *current* product or practice, and they develop and articulate knowledge about a *future* product or practice, possibly together with researchers or designers.

The difference between ‘is’ and ‘ought’ is also observed by Haddon and Kommonen (2003) who draw attention to the difference between the tradition of social science, which is about studying and representing a current situation, and the tradition of design, which is about imagining and visualizing a future situation. It seems that end-users, and researchers and designers who act as spokespersons for them, will typically talk about a *current* situation (‘is’), and that researchers and designers will typically talk about a future situation (‘ought’).

If we look at the role of different kinds of knowledge in the process of turning an idea into a product, we can see that in participatory design and ethnographic fieldwork the current situation and practice of end-users are starting point, and new products are designed, based on a combination of end-users' (tacit) knowledge and skills, and researchers' and designers' knowledge and skills. In the lead user approach and contextual design a certain kind of knowledge is privileged: that kind of knowledge which can be applied relatively pragmatically and efficiently in the design process. In that respect, the research process is secondary to the design process. And lastly, in co-designing and empathic design researchers' and designers' ideas about a certain (innovative) technology or their ambition to create some new product is starting point, and they attempt to match that to end-users' experiences, their needs and preferences.

Discussion and conclusion

We described six moves of human centred design, and we distinguished between two different moves: a move of end-users moving towards research and design activities, in participatory design, the lead user approach and co-designing; and a move of researchers and designers towards end-users, in ethnographic fieldwork, in contextual design, and in empathic design. Furthermore, we suggest that these moves are towards different (underlying) values and are part of three different traditions: 1) participatory design and ethnographic fieldwork are attempts to move towards democracy and end-users' emancipation; 2) the lead user approach and contextual design are associated with producing results, with pragmatic and commercial applications; and 3) co-designing and empathic design can be seen as moves towards design activities, towards creativity and searching for inspiration together with end-users.

We can *approximately* plot these moves in time and space: participatory design and ethnographic fieldwork have their roots in Northern Europe, in the 1970/80's in research and academia; the lead user approach and contextual design are applications of such methods to commercial settings, associated with businesses in the USA; and co-designing and empathic design are relatively recent developments in which researchers and designers, from academia and businesses, from Europe and the USA cooperate.

Participatory design, ethnographic fieldwork and contextual design have their roots in the design (and evaluation) of business applications or workplace products, often for a specific group of people doing a specific task. Co-designing and empathic design are associated – even though not exclusively – with the design of *consumer* products, often for an anonymous mass market of people who are doing all sorts of things (not one specific task). The lead user approach is applied for the design of both workplace products (e.g. medical devices) and consumer products (e.g. extreme sports).

Independent of the choice for one of these moves is the importance of communication and sharing of knowledge: not only between researchers/designers and end-user, but also between project team members and with other stakeholders. Lester and Piore (2004) advocate to approach innovation as an *interpretive* process – as an alternative to the currently dominant practice of approaching and organising innovation as an *analytical* process: ‘In the analytical view, the customer has preexisting needs, and the job of the developer is to identify those needs and then to create products that meet them in an optimal way. ... In the interpretive view, the customer has no needs until they are articulated, and this articulation is what the interaction between designer and customer is all about’ (p. 76). They suggest to facilitate ‘conversations’ between people, both inside and outside the firm, with different stakeholders, conversations which are more about exploring and exchanging knowledge than about making decisions and creating closure, and they suggest that managers can facilitate this by acting like a ‘hostess at a cocktail party’ (p. 174-5).

This perspective draws attention to the need to allow for iterations in research, design and evaluation processes, and the need for a multi-disciplinary approach (cf. characteristics 3 and 4 HCD in the Introduction).

For HCD to be of (any) value one must organise and facilitate ‘conversations’, multi-disciplinary teamwork, and iterations, otherwise the ambitions to provide end-users a voice (participatory design, ethnographic fieldwork), to learn from end-users (contextual design, lead user approach), or to search for inspiration together with end-users (co-designing, empathic design) will not materialize.

Conclusion

We can answer our research question – *Which methods or practices can be applied for which kind of project, and for which goals?* – with the following propositions:

- If a goal of the project is to understand a current (work) practice of end-users, or to emancipate end-users, then methods like participatory design or ethnographic fieldwork are appropriate;
- If a goal of the project is to imagine or envision a *future* practice or product, or to seek inspiration together with end-users, then methods like co-designing or empathic design are appropriate;
- If a goal of the project is to create results rapidly, or if the project is in a work or commercial or setting, then methods like the lead user approach or contextual design are appropriate;
- If researchers and designers wish to move towards end-users, to obtain insight in the their (work) situation, then methods like in ethnographic fieldwork, contextual design and empathic design are appropriate;
- If end-users wish to move, and are allowed to move, towards research and design activities, then methods like in participatory design, lead-user approach and co-designing are appropriate.

Please notice that in a project one may very well mix methods, or one will appropriate or modify a method for a specific project.

We think it is worthwhile to conduct human-centred design, to involve end-users in research and design early-on in a project, and throughout a project. Furthermore, we suggest that one can select a method which is appropriate for a specific project, and that this selection can be based on a choice for whose knowledge (of researchers/ designers or of end-users) or which knowledge (about the present or about the future) one wishes to privilege, and on a choice concerning the kind of goals one wishes to pursue.

Choosing the right method to involve end-users in research and design can be thought of as choosing a position on the dance floor (Figure 1), choosing dance partners, and then performing dance moves together.

Acknowledgements

We would like to thank project team members Nicole de Koning and Sander Limonard for their contributions.

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¹ In the remainder of this paper we will talk about ‘products’ as an economical way of referring to ‘products, services or systems’.

² Responding to the conference theme of ‘dance’ we can rephrase such questions into questions like: Who dances with whom? How do the participants move? How do the participants perform different possible dance moves, for example: a march –making strides, aiming for progress; a line dance – well-organised and synchronised moves; a waltz – circular moves and lots of iterations; or a tango – a game of moving towards each other and then moving away... To whose tune are they dancing? Who issues the marching orders? Is someone waltzing off with something?

³ We resist the temptation to discuss ‘success’ of certain methods or practices, or how methods can be applied ‘successfully’. Such a discussion would need to start with a clear definition success: Successful for whom? In what way? Within which scope? Commercially successful for the manufacturer? Successful at the time of market introduction? Financially successful five years after market introduction? Satisfying for the people using this product in their daily work? Operationally successful, e.g. with respect to cutting costs? There are so many perspectives to look at ‘success’... Therefore we focus on *description* and when we conduct evaluations we will try to be explicit about what perspective we take for this evaluation.

⁴ Moreover, we are interested in the design of products for a substantial market, which means that we do not focus on involving end-users for the design of e.g. a yacht which is bought by one person. Furthermore, we are interested in user involvement in the *design* process, not in user involvement in the *production* process. This implies that we do not focus on mass-customization, where a customer can e.g. choose between options on a website and thus generates a ‘personal’ pair of jeans, or on user generated content, where one e.g. writes, edits or publishes articles.

⁵ We tried to create an overview of a limited number of methods/practices, and therefore focused our scope. We restricted our review to methods in which researchers and designers interact personally with end-users – either personally face to face, or via personal online communication. As a consequence, we did *not* include Quality Function Deployment or Value Sensitive Design (Friedman and Kahn 2002), where end-users’ are typically *represented* rather than that they participate themselves, or conjoint analysis, where end-users’ utterances are typically gathered via questionnaires rather than through conversation. We did not include methods like usability engineering or usability testing (Norman 1988; Nielsen 1993), because these are mostly applied in later phases of development project (and we are interested in earlier phases), and because these methods are associated with studying what people find “usable” (and we are interested in studying what people find “useful”). Furthermore, we restricted our review to methods which are applied (also) in the front-end of innovation, and therefore excluded e.g. beta-testing and market trials (e.g. Kaulio 1998). We did also exclude ‘critical design’, which seeks to evoke reactions of end-users (e.g. Sanders 2006), but for which user involvement is not necessary *during* the design. Furthermore, we did not differentiate between different methods for interviewing, e.g. free elicitation, laddering or ZMET (e.g. van Kleef et al. 2005).