Participatory Scenario Generation: Communicating Usability Issues in Product Design through User Involvement in Scenario Generation

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Abstract: Scenarios have proven to be a valuable tool in evaluating and communicating usability issues in consumer product design. Scenarios are explicit descriptions of hypothetical use situations. Realistic scenarios can serve as a valuable frame of reference to evaluate design solutions with regard to usability. To be able to achieve this required level of realism, involving users in scenario generation is essential. In this presentation we discuss how and where users can be involved in a scenario based product design process by means of examples of design projects that were executed by master students Industrial Design Engineering of the University of Twente. We distinguish direct and indirect scenario generation. In direct scenario generation the user is actively involved in a participatory scenario generation session: the scenarios are created together with users. Indirect scenario generation is an approach in which scenarios are created by designers based on common analysis techniques like observations and interviews. These scenarios are then offered to users for confirmation. Both types of user involvement in scenario generation can be aimed at either current use scenarios which describe the current situation or future use scenarios which include a new product design. The examples show that all strategies can be applied successfully to create realistic scenarios. Which strategy to choose depends among others upon risks and privacy issues, occurrence of infrequent events and availability of users. Furthermore, the variety of approaches shows that there is still a lot to explore with regard to benefits and limitations of the many techniques that can be applied in generating scenarios for consumer product design. We hope to contribute to this field by means of the research in our group and the work of students in the SBPD course.

Keywords: Scenario Based Design, Usability, Participatory Design, Design Education

The ease of use of a particular product is not a quality that is intrinsic to only that product. For instance, when we consider how easy to use a certain mobile phone is we might conclude that an elderly person does not text message as efficient as a teenager; calling someone from a noisy factory is not as effective as calling someone from a quiet place and using the phone’s camera function for snapshots satisfies the user much more than when it’s used for professional photos. Therefore ease of use or usability can be concerned as a quality attribute of the interaction between a product design and a potential user in a particular environment for a specific purpose. It depends not only on product characteristics but also on the use situations in which the interaction takes place (van der Bijl - Brouwer and van der Voort, 2008). To be able to reflect on, explore and communicate those potential use situations a designer needs some kind of representation of
this use situation just like he uses sketches, models and prototypes as representations of a product design. Scenarios can serve as such a representation of potential use situations.

Scenarios have already proven to be a valuable tool in evaluating and communicating usability issues (Carroll, 2000). Although some studies which explore the application of scenarios in consumer product design have been undertaken (for instance (Fulton Suri and Marsh, 2000)), until now most applications of scenarios in design have taken place in the software domain. At the Use Anticipation in Product Design research group of the University of Twente we explore how scenarios can be integrated in the design process of consumer products. One of the topics we address is the means by which users can be involved in the creation of realistic scenarios. The use of scenarios to represent use situations is most valuable when each of the scenario elements is realistic. While the product in a scenario can be created and defined by the designer, knowledge about the other scenario elements like user characteristics and context of use is to a large extend in the head of potential users. Therefore it seems essential to involve them in scenario generation. In this paper we will discuss user involvement in scenario generation by means of projects of students that participated in the course scenario based product design of the industrial design engineering (IDE) master program of the University of Twente. We will firstly give an introduction to scenario based product design (SBPD). Then we will propose four different strategies for user involvement in scenario generation. Subsequently we will illustrate this by presenting three examples of the IDE students’ projects. Finally we will discuss the benefits and limitations of the presented strategies.

**Scenario Based Product Design**

SBPD is a generic term for design approaches that apply scenarios in the design process with the aim of achieving a high quality of product interaction. Rosson and Carroll (1995) argue that scenarios should supplement traditional requirements analysis. Scenario based ‘specifications’ indicate product behaviour in terms of what a user in a certain context can do with a product and how it will interact as opposed to technical or functional specifications where traditionally focus is placed on what the product will do and how it does it. Scenarios are defined as explicit descriptions of the hypothetical use of a product by a certain person under certain circumstances (Miedema et al., 2007). Scenarios have characteristic elements (Rosson and Carroll, 2002). They include or presuppose a setting or starting state. Furthermore scenarios describe the behaviours and experiences of actors or users that have specific goals. The plot of a scenario is composed of sequences of actions aimed at achieving the goals and events such as things that happen to actors and changes in the setting. In scenarios these elements are not considered independently but in an integrated way. Figure 1 shows the elements of a scenario.
In SBPD use scenarios are applied in the design process with the aim of designing products with better usability. Usability is specified by ISO 9241 (ISO, 1998) as the extent to which products can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. Since user, goals and context of use are specified in a scenario, usability can be defined for a product with regard to a scenario. A scenario becomes valuable when it is accompanied by an indication of the concerned product’s usability for example problems that are expected (effectiveness) or the way users feel about a certain scenario (satisfaction). Such usability indication supports designers in considering trade-offs with regard to a design and scenario. This usability indication can either be assumed by a designer based on previous experience with comparable products and scenarios or be better substantiated by evaluating the scenarios together with users. The latter not only leads to a more reliable usability indication, but also confirms if a scenario is realistic. We define these scenarios as confirmed scenarios.

**Scenario Classification**

Nielsen (1990) proposes to classify scenarios according to their purpose, source of inspiration and medium of expression. In this paper we will use this taxonomy to classify the scenarios that were applied in the student projects. We will particularly focus on user involvement as a source of inspiration.
**Purposes of Scenarios**

Scenarios can be applied for various purposes in the design process. Nielsen (1990) distinguishes communicating user interface issues to an audience, structuring thinking and providing background for refinement and testing interfaces and theories. Fulton Suri and Marsh (2000) state that benefits of applying scenarios in design include exploration and communication of qualitative aspects of the user experience at the earliest stages of design, evaluation of early design ideas and communicating human factors issues to clients and colleagues. Rosson and Carroll (2002) suggest amongst others to apply scenarios for facilitating participatory design - design work that takes place as a collaboration between developers and the people that will use the system, for stimulating imagination and encouraging ‘what-if’ reasoning about alternatives and helping designers respond to current needs while also anticipating new needs. All aforementioned authors stress that one of the greatest benefits of scenarios is that they can serve as a common language in communication between various stakeholders. In this paper we will focus on the use of scenarios as a communication tool between designers and users, since this purpose benefits most from user involvement. This communication is either aimed at getting a clear view on the current situation or problem domain or getting stake-holder feedback on future use situations that include new product designs.

**Medium of Expression of Scenarios**

Scenarios can be represented in different ways; examples are storyboards, narratives, animations, movies, videos of role-playing and virtual reality. A representation can be more or less detailed. For instance a photo storyboard can contain a lot of detail while an abstracted storyboard might leave more room for interpretation. The choice for a certain representation depends on the purpose of a scenario. A narrative for example offers good opportunities to include a lot of detail while a storyboard is more suitable to get a quick overview of the use situation.

**Sources of Inspiration for Scenarios**

Several sources can be used to inspire scenario generation. Nielsen (1995) distinguishes sources that are based on empirical observations and designer’s ideas, meaning that scenarios can be built to reflect either the world as it is now or the world as it may come. Empirical observations include for example ethnography (Blomberg et al., 2003) and probing (Gaver et al., 1999). Designer’s ideas can be inspired by techniques such as role-playing (Simsarian, 2003) and character exploration and description (Djajadiningrat et al., 2000; Nielsen, 2002). Carroll (2000) adds some more sources that can inspire scenario generation including participatory design, reuse of prior analyses, scenario typologies, technology-based scenarios, theory-based scenarios and transformations. When we consider user involvement as a source of inspiration for scenario generation, this involvement can be part of either empirical observations in which users play a passive role, or participatory design and scenario generation in which users play a more active role. A third means for user involvement is scenario confirmation which will be explained in the following section.
Four Strategies for Involving Users in Scenario Generation

Users can be involved in scenario generation to communicate current or future use situation issues. In this section we will present four means of involving users in scenario generation, two for current scenario creation and two for future scenario creation (see Table 1).

Table 1: Involving Users as a Source of Inspiration for Scenario Generation

<table>
<thead>
<tr>
<th>Source of Inspiration</th>
<th>Participatory Design and Participatory Scenario Generation</th>
<th>Non-Participatory Scenario Generation and Participatory Scenario Confirmation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analyse Current Use Situations</td>
<td>Current Scenario Generation</td>
<td>Current Scenario Generation</td>
</tr>
<tr>
<td>Evaluate Future Use Situations</td>
<td>Future Scenario Generation</td>
<td>Future Scenario Generation</td>
</tr>
</tbody>
</table>

Analysing the Current Situation or Problem Domain

A scenario that is used in communication with stakeholders to get a clear view on the current situation is called a problem scenario or a current scenario. Basically, we can distinguish two strategies of involving users in analysing the current situation.

Firstly, realistic problem scenarios can be generated by analyzing use situation elements (user characteristics, environment, objects, task goals etc.) individually with techniques like observation, interviews and task analysis. This data can be translated by the designer into integrated problem scenarios and be fed back to the stakeholders for confirmation. We define this approach as indirect participatory scenario generation.

A second means to create realistic problem scenarios is creating scenarios together with users, for example by means of a game (Iacucci et al., 2000). We define this approach as direct participatory scenario generation (PSG). To prepare a PSG session it is often necessary to analyze individual elements by means of common analysis techniques like interviews or observations to be able to focus the session.

Evaluating Future Use Situations

Users can also be involved in generating future or design scenarios that include a new product design. In this case PSG includes participatory design (PD). In PD users are actively involved in the design process (Ehn, 1993). By considering an idea for a product design together with a scenario of how this design can be used, valuable feedback can be gained from the user without having to build a prototype for usability tests. Some examples of how future scenarios can be created within participatory design can be found in (Iacucci et al., 2000) and (Urnès et al., 2002).

Stakeholder feedback can also be deduced indirectly by generating ideas by traditional creativity techniques and including them in the current scenarios, thereby creating future scenarios. These future scenarios can be shown to users for confirmation on their realism and usability issues. We define this means of user involvement as indirect future scenario generation.
These four strategies of involving users in the generation of scenarios are presented in figure 2. The future elements in the future scenarios include the product design and the new actions or events that it will evoke.

![Diagram of four strategies of involving users in scenario generation]

**Figure 2: Four Strategies of Involving Users in Scenario Generation**

**Examples**

SBPD is not a single design method. Instead it is a category of numerous approaches that apply scenarios for different purposes, with different sources of inspiration and means of expression. Stolterman (2008) writes: “designers need to design their process to accommodate the specifics and unique conditions of the task at hand” (p.62). Therefore each design case needs a dedicated approach which can include the application of scenarios. We will illustrate this by means of example design projects that were executed by master students IDE of the University of Twente that participated in the course SBPD.

**Set up Course SBPD**

The course SBPD comprises 5 European Credit points (140 study hours). The learning goals of this course include that by concluding the course the student should

- have insight in benefits and limitations of a scenario based design method
- have insight in purposes, means of expression and sources of inspiration of scenarios
- have taken notice of various forms of scenario based design and various types of scenarios.
- have experience with applying various techniques of scenario based design.
- have experience in developing, executing and evaluating a scenario based design method.
To reach these learning goals the students are firstly provided with SBPD methodology by means of four workshops and an assignment in which they have to review scientific publications on SBPD. Secondly, students develop their own SBPD approach in teams. This approach is executed and evaluated by applying it to a case which students can choose freely and in which someone of a certain profession should be supported in achieving a certain goal. The course was first given in 2005 and until now 29 teams have executed the group assignment. In the next sections we will present the results of three teams that applied different means of user involvement.

**Example One: Catching Young Cows**

The first example concerns the problem that farmers can experience when transporting young cows from the pasture to the barn, particularly catching the cows. The students of this team wanted to support the farmer in catching young cows by means of a new design.

**Approach and user Involvement**

To get a good understanding of the current situation, particularly the actions taken, one could observe how the task is executed in the actual environment. However, in this case that was not feasible because catching young cows in the pasture includes a lot of risks. Therefore the group chose to analyze the user characteristics, user goals, the setting, events and tools (products) independently by means of observation of the setting and interviews with users. These data were used as input to a role-playing game in which firstly the current situation was acted out by the user (in this case the farmer) and secondly possible future situations were generated by the designer and user by means of applying props. Props are objects that act as physical forms to which functions can be added in a role-play (Howard et al., 2002). The resulting ideas and scenarios were used by the designers to create concepts.

With regard to Nielsen’s taxonomy the scenarios that were generated can be classified as follows: the purpose of the current scenario is to clarify the current way of working. The purpose of the future scenario is to generate product ideas and to evaluate the use of the created ideas with the users. In both cases scenarios are used as a communication tool. The input to the role-playing game is the result of the interviews and observations. The sources of inspiration are the user and the role-playing game. The user involvement strategies are direct current and future scenario generation. The medium of expression is a photo storyboard of the acted out scenario in the role-playing game. The user is involved in the interview that precedes the PD session and in the session itself. A scheme of the approach is shown in figure 3.
Results

The interviews and observations gave insight in the user, goals, setting, events and tools. The results of this first analysis were used to develop the role-playing game. The game consists of a miniature environment which represents the setting. The sub goals for the main goal ‘catching cows’ are assigned randomly by means of a spinning disk. Events are introduced by means of cards. Subsequently, the actor acts out the scenario with small puppets that represent users. Figure 4 shows how the scenario elements are included in the game.

![Figure 4: The Elements of the Role-Playing Game](image)

The current scenario was acted out by the user. The designers made photos of each stage so they could represent the scenario by means of a storyboard. Figure 5 shows two steps in the current scenario.
Subsequently the designers and user created new future scenarios by means of props and in this case included objects like scissors, a knife and a perforator. Figure 6 shows an example of how a prop was used in generating future scenarios.

![A tractor with trailer is driven into the pasture. One person drives the tractor while another opens the fence. The last person is just standing near the fence.](image1)

![The three persons are preparing catching the young cows by setting up some sort of trap.](image2)

Figure 5: Two Steps in the Current Scenario

Figure 6: Example of the Use of Props in Future Scenario Generation

The future scenarios that were generated were immediately evaluated with the user. One scenario was chosen to be developed into a final concept. Figure 7 and 8 show a part of the final scenario and concept.

**Discussion Example 1**

The role-playing game gave a clear insight in the way the farmer currently works. Not only were risks of real-time observation avoided, events that do not happen frequently could also be observed.

The creativity session by means of props resulted in many ideas. Most of the ideas were created by the designers. The participating farmer had difficulties in thinking beyond the current way of working. However, the participating farmer was surprised by the usefulness of the ideas of the designers.

In this project only one farmer was involved. The danger of this fact is that a solution is developed that only fits this specific farmer. Furthermore the designers knew the farmer personally. This might have stimulated the farmer in participating in the role-playing. Other studies (Urnes et al., 2002) have shown that users can be reluctant with regard to role-playing.
Example Two: Delivering Newspapers

The problems that were tackled in the second example consider the work of paperboys who deliver newspapers.
Approach and Taxonomy

To be able to get a clear view on the current situation the group selected the target group based on literature about newspaper delivery and interviews with distribution centres. Subsequently three users were shadowed in their natural environment during work hours in ‘interactive observation sessions’. The users were asked to comment on their activities during observation and afterwards they were interviewed about their goals and events that can occur. The data were translated by the design team into written global scenarios that describe a complete work day and problem scenarios that focus on specific problems. In a workshop those scenarios were presented to a group of other users for confirmation. The users were then involved in a participatory design session in which they had to come up with new solutions by means of traditional creativity techniques. The ideas were placed back in the problem scenarios for evaluation. So unlike the farmer case the future scenarios were not a direct result of the creativity session but merely a result of the evaluation of the ideas generated in the creativity session.

According to Nielsen’s taxonomy the scenarios can be classified as follows. The purpose of the global and problem scenarios is to get feedback from users about the interpretation of the analyzed data (communication tool) and to serve as a frame of reference for evaluation of the ideas. The sources of inspiration include the data that were analyzed in the first phase by means of literature, interviews and observation in situ. The user involvement strategy applied was indirect current scenario generation. Users were not involved in future scenario generation or evaluation. Finally, the medium of expression is a narrative. A scheme of the approach is shown in figure 9.

Figure 9: Approach Project ‘Delivering Newspapers’
Results

Based on literature the target group was defined as scholars of 15 to 18 years old that deliver newspapers before going to school, since they cover more than 60% of all paperboys and are easy to approach. Three users of the target group were followed one morning by someone of the design team and were subsequently interviewed about goals and events. Based on the observation sessions five problem domains were defined regarding the following goals: storing newspapers on a bike, taking the needed number of newspapers from stock, transporting newspapers to a mailbox, taking one newspaper from reduced stock and delivering a newspaper to a customer. Different events and aspects of the settings like mailboxes that are hard to reach were described in the problem scenarios. Figure 10 shows two pictures that were taken during one of the observation sessions. Figure 11 shows a part of the accompanying problem scenario.

Figure 10: Two Pictures that were Taken During Observation

‘...Bram places his old bike against the lamppost near the playground. He is ready to deliver to the last, but most complicated part of his working area. Fortunately, from the lamppost it is easy to walk to the last 24 houses. He has divided this area into two parts. Consequently Bran has to walk two rounds of each twelve houses. Thus he can put a pile of twelve newspapers on his arm and deliver to the houses quickly and conveniently...’

Figure 11: Part of the Paperboy Problem Scenario

In a workshop the scenarios were presented to four other users from the target group (see figure 12). They confirmed the scenarios although some of the users worked under different conditions than others. For instance the paperboys that worked in rural areas did not recognize the problems related to apartment buildings.
Each of the above mentioned goals were then used as input to a brainstorm session in which solutions were created. However, each user firstly reasoned from his own experience. Later, the facilitator of the session was able to return the focus of the participants to the defined problem scenarios. The solutions were visualised by the present designers. Figure 13 shows one of the created solutions. Finally, the solutions were put back into the global and problem scenarios for evaluation and resulted in future scenarios that included the generated ideas. Figure 14 shows a part of the resulting future scenario.

Figure 13: Example of the Generated Ideas, a Pouch Bag

‘...Bram places his old bike against the lamppost near the playground. He is ready to deliver to the last, but most complicated part of his working area. Fortunately, from the lamppost it is easy to walk to the last 24 houses. He takes 24 newspapers from his newspaper bag, folds them simultaneously and puts them in his ‘pouch bag’ that is still attached to the front of his steer. He quickly closes the flap of his newspaper bag. Then he puts the pouch bag around his shoulder by means of a wide shoulder strap and starts with the last part of his working area...’

Figure 14: Part of the Paperboy Future Scenario
Discussion Example Two

The observations in situ combined with interviews gave the design team sufficient insight in the current situation to create realistic global and problem scenarios. The scenarios were confirmed by the workshop participants. The team concluded correctly that this type of analysis is only possible when the target group is easily approachable and willing to actively participate and observation does not include any risks or harm privacy rules.

The problem scenarios were supposed to give input to idea generation. However, since only goals were used as input to the creativity session instead of complete scenarios, the users firstly generated solutions which only fitted their personal situation. In addition, the narrative form that was used for representation did not provide enough overview to gain immediate focus from the participants. The facilitator had to put a lot of effort in keeping the focus on the chosen problems. Part of this focus problem is probably caused as well by the fact that multiple problems were tackled at the same time. Since it was not clear if total or partial solutions were requested the resulting ideas fitted different problems.

The presence of multiple users in the workshop supported communication about the problem domain. The discussions gave the designers more insight in the current situation.

Participants were reluctant in sketching or writing down solutions. This was solved by designers that assisted the users in visualising solutions.

Figure 9 shows that users were involved in scenario generation in the first phase in interactive observation and interviews and in the second phase in scenario confirmation. As mentioned above they also play a role in creating ideas. However, in this part of the workshop the scenarios were not used and therefore the users have very little input in the subsequent future scenarios.

Example Three: Organizing Children Development Information

In the third project students analyzed the work of kindergarten teachers with regard to organizing information about the development of individual children.

Approach and user Involvement

The goals and user characteristics of kindergarten teachers were analyzed by means of interviews. Furthermore a CARD game was executed to give insight in their day schedule and problems that they experience during the day. This included goals, actions and events. CARD is a participatory technique for analyzing and redesigning task flows (Tudor et al., 1993). An observation of a kindergarten was executed to analyze the setting and products that are currently used to organize information about individual children. From these several analyses the project group created current problem scenarios that were fed back to kindergarten teachers that participated in a workshop. In the same workshop a participatory design session was executed in which the created scenarios were used as input to a role-playing game in which users by means of props sought for solutions to improve the current situation. The difference with the approach of the paperboy-project was that the current scenarios were integrated in the idea generation session.

With regard to Nielsen’s taxonomy the purpose of the current scenario is to get user feedback on the current situation and the purpose of the future scenario is to generate product ideas and to evaluate the use of the created ideas with the users. The sources of inspiration
for the current scenarios are the interviews, observation and CARD game. The sources of inspiration for the future scenarios are the current scenarios, props and users. The user involvement strategies were indirect current scenario generation and direct future scenario generation. The medium of expression is a narrative. Figure 15 is a schematic representation of this approach.

![Figure 15: Approach Project ‘Kindergarten Teacher’](image)

**Results Example Three**

The interviews and particularly the CARD game gave good insight in the tasks of kindergarten teachers and the problems they experience with regard to organizing information of children’s development. The main problem is that the educational part of the morning, in which children work on individual assignments require a lot of organizing and administration qualities from the kindergarten teacher. They need to plan in advance who should be doing what, they need to support the children in their assignments and they need to observe and record the development of the individual children. Many of these facts are written down on scrap paper. Figure 16 shows the setting. Below a part of the problem scenario is shown.
In the workshop the scenarios were shown to two kindergarten teachers and they confirmed that the scenarios were realistic. Subsequently they were asked to role-play the problem scenarios in the actual environment and the designers introduced props such as a wallet, a watch and a cardboard plate to create ideas that could transform the current scenario into a future scenario. The teachers actively participated in the session but had some difficulties to think up multiple product ideas by themselves. However, the interaction between designers and users led to three promising concepts. The designers detailed the concepts, compared them to the initial scenarios and assessed them on their feasibility. Figure 18 shows the final concept called ‘Wallie’. It’s a small organizer that the teacher can attach to her belt. It contains preprint cards with symbols for skills and space to make notes. A part of its accompanying future scenario is shown in figure 19.
Discussion Example 3

In this approach current scenarios are created indirectly while the future scenarios are created directly. In this case the group could also have chosen to combine the current scenario generation and the PD session like the farmer group did. However, since their problem was not as well defined as the problem of the farmer group the separate CARD session proofed to be valuable to discuss focus points with the team members.

In this group the narrative representation form did not cause as much communication problems as in the paperboy project. This might be due to the fact that the same users of the same school were involved in the CARD session as in the PD session. Therefore the scenarios were probably very familiar since they represented their own situation.

Discussion

In the introduction we proposed four strategies of involving users in a scenario generation process. The examples showed that all strategies can be applied successfully to create realistic scenarios. The examples also show that the strategies can be followed by applying different techniques. Furthermore it is possible to apply a combination of user involvement strategies like the kindergarten project showed.

In the examples different numbers of users were involved. Only in the paperboy case were other users involved in the PD session than in the interactive observation session. Involving different sets of users will probably result in scenarios that are valid for a wider target group. The paperboy project also showed that involving multiple users in scenario confirmation elicits discussion between users and therefore reveals more tacit knowledge about the current situation.

The actual current use situation was observed by the paperboy team by shadowing the users during their work. In the other cases the current use situation was deduced indirectly from the users. In the farmer case this approach was chosen because direct observation would have been too risky. In the kindergarten case this approach was chosen because of privacy...
reasons. In both cases this indirect approach had the advantage of revealing events that do not occur frequently.

Creating solutions together with users in a PD session seems most valuable when the session is combined with a PSG session. The farmer and kindergarten teacher project showed that when creating solutions is directly related to the creation of future scenarios, the sessions are more focussed. The scenarios serve as a common frame of reference to which all participants can relate. In the paperboy case the ideas were also generated together with users but this happened separately of the creation of future scenarios. The result was that participants lost focus because they could only relate to their own personal experience.

From the examples can be concluded that a PD session which is combined with PSG results in ideas with more realistic scenarios and usability indication. However, these ideas might be less detailed than the ideas or concepts created independently by designers.

Conclusions

The examples in this paper show that involving users in generating scenarios can result in a good overview of both current and desired (future) use situations. Since usability is an issue that depends on both product characteristics and the situation in which the product is used, an accurate view of these use situations represented in scenarios serves as a valuable frame of reference in the design process.

In this paper we presented four ways of involving users in scenario generation. They can be involved directly in participatory scenario generation sessions or indirectly in scenario confirmation sessions. Furthermore those sessions can be aimed at either analyzing the current situation or a future situation which involves a new product design. Although the student projects presented in this paper were executed in limited time and fictive in the sense that there was no real client, they do illustrate that involving users in creating realistic scenarios is essential. Furthermore they show that the four strategies of involving users have different benefits and limitations Which strategy to choose depends among others upon risks and privacy issues, occurrence of infrequent events and availability of users.

The variety of approaches shows that there is still a lot to explore with regard to benefits and limitations of the many techniques that can be applied in generating scenarios for consumer product design. Some issues that need further investigation include:

- Efficiency, risks and opportunities of techniques to analyze the current situation.
- The means by which scenarios should be represented in communication with users.
- The extent to and the means by which users can participate in creating future scenarios.
- The number of users that should be involved in scenario evaluation or generation sessions at the same time.

We hope to contribute to this field by means of the research in our group and the work of students in the SBPD course.

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References


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Mieke Brouwer (1975) graduated in industrial design engineering at Delft University of Technology in 2001 with a specialisation in user interface design. From 2002 she has been teaching user interface related topics such as cognitive ergonomics and scenario based design at the industrial design engineering education program of the University of Twente. She combines this work with a PhD. research on design for dynamic use situations

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