

Thinking and Exploring Use Situations

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Within design teams, knowledge of the variety of situations in which products are used remains often unshared. Furthermore these ‘dynamic and diverse use situations’ are not always applied consistently to contextualize use evaluations. This paper describes the development of guidelines to deal with these issues in the design process. The initial guidelines were aimed at generating and applying an evolving explicit frame of reference of product use that could be used to set up use evaluations, to share knowledge of product use and to inspire solution generation. An application of the guidelines to the design of a carrier bike by four student teams showed the added value of using the frame of reference in setting up use evaluations, the value of *explorative* activities to create the explicit frame of reference, and unexpected benefits of the additionally created *mindset*.

Key words: *Usability, user experience, design method, use situations, context of use.*

1. Introduction

As opposed to tailored products, industrially manufactured products are used by diverse users, for different purposes in varying contexts. We define this as dynamic and diverse use situations (DDUS). Dynamic use situations refer to the change of situations in time for one product, for example, one day you might use your car to drive to your work to be in time for a meeting, while the next day you might use it to transport your groceries from the supermarket to your home. Diverse use situations refer to the change of situations in time and space for different versions of the same product. For example, someone else might possess the same type of car, but only uses it for recreational purposes, for example going on vacation.

In a previous study [9] we discussed the difficulties of design for DDUS. It is difficult to:

- Predict the variety of use situations a product will encounter: use situation analysis
- Anticipate what kind of user experience or usability issues will occur when the designed product encounters these situations: use evaluation
- Deal with conflicting requirements from the different use situations in one design: solution generation

For example, when designing a compact photo camera, designers could imagine the camera being used by students while making pictures of themselves on a party or by skiers making pictures of the mountains in the cold (use situation analysis). For the first situation one could evaluate that it can be difficult to get everyone in the picture (use evaluation), in the second situation the camera could be difficult to control while wearing gloves (use evaluation) and would need for example a type of display which allows reading in bright sunlight (solution generation). In reality a compact camera will be used in an enormous amount of different situations, which makes it very difficult to analyse these situations and integrate this knowledge in the design process.

In this paper, the term ‘use issues’ refers to both usability and user experience, since both issues are not only dependent on product characteristics, but on the user, goal and use context as well. Usability is the extent to which

a specified user can achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use [5]. Furthermore we adopt the ISO definition [8] of user experience that states that user experience concerns a person's perceptions and responses that result from the use or anticipated use of a product, system or service.

Design for DDUS, as a research topic is not new in the sense that it recognizes the difficulties of dealing with different users in different contexts. For example, Green and Jordan [4] state that designers should have insight in use situations to be able to design products that are pleasurable to use, whatever the circumstances. Khalid [7] discusses the difficulty of predicting needs, motivation, context and action which are relevant for the creation of user experience. Finally, Johnson [6] states that design problems with regard to usability escalate the more variable and unpredictable the context of use becomes. Although these studies confirm the difficulty of designing for DDUS, they give little guidance on how to deal with this problem in practice. Therefore the objective of this research is to develop a support for dealing with DDUS in design.

Firstly, a retrospective case study in design practice was conducted to analyze how designers deal with DDUS [9]. Three design projects of different companies were studied in which usability was considered an important issue. The case studies showed that all participating product developers were aware of the dynamics and diversity of use situations. In some cases knowledge about use situations was captured in personas, scenarios or other types of documentation to capture a specific use situation aspect. However, knowledge about users, contexts and goals often remained implicit and was mostly not shared. As a consequence, evaluations of solutions tend to have an opportunistic character. Particularly informal evaluations often lack contextualization (see also [10]), partly because designers have limited knowledge of this context of use.

Based on these results a set of guidelines was developed to support designers in dealing with DDUS in the design process. This paper will firstly introduce the initial set of guidelines that was developed. Then we describe an application of the guidelines to a design project in which four student teams designed a carrier bike. Based on an evaluation of this study, we introduce an amended set of guidelines in the discussion and conclusions.

2. The initial support

The objective of this study was to develop a support for product developers to deal with DDUS in their design process. It was decided to develop guidelines that designers can use to develop their own design approach, because this kind of support is flexible to apply. A flexible support will allow for adaption of the design approach to the design situation at hand [1, page 17]. It is not intended to alter current methods of user testing, solution generation or decision-making. Instead it is aimed at creating and applying an explicit frame of reference of use situations and related use issues to: improve the external validity of use evaluations; improve sharing of knowledge of product use; and inspire solution generation.

Firstly, it is expected that the frame of reference will improve the external validity of use evaluations by offering a source to set realistic test conditions. Cushman and Rosenberg [3] state that usability test results may not be valid unless the conditions of the test closely match those of actual product use. Therefore insight in and agreement on these use situations is needed. Secondly, sharing knowledge explicitly would help product development teams in setting requirements and creating usable designs [12]. The explicit frame of reference is expected to contribute particularly to sharing knowledge in order to support decision-making with regard to

selecting solutions and selecting target use situations and issues. Finally solution generation can assumingly be influenced by the frame of reference by acting as a reminder of the targeted use situations.

The guidelines are integrated in a workbook [12] that describes how the frame of reference can be created and how it can be applied. The focus of this support was on its application in use evaluations. Additional to the guidelines, a technique was developed to create a first frame of reference of product use: the Envisioning Use workshop. In the next section we describe this technique. Subsequently we summarize the workbook.

2.1 The Envisioning use technique

The development of the Envisioning Use technique is described in [10] and [11]. The basic idea is to bring members of a product development team together and have them share everything they know and do not know about the use of a particular type of product. This knowledge can be based on what they have learned from user tests, from experiences gathered in preceding similar projects or personal experience with the product. The knowledge is brought together in what we call the ‘product use mind map’, a wall of flip charts with sticky notes that summarize the knowledge and make it explicit (figure 1).

Through an iterative approach in which this product use mind map was explored in different workshops with experienced designers, we found that the most successful structure of the mind map was to divide sticky notes in knowledge of use situations and knowledge of use issues. Use situations concern possible user, context or goal aspects that a product can encounter while use issues connected to this use situation aspect describe what can, should or should not happen with regard to usability or user experience when a product encounters those situations.

Sharing the knowledge is achieved in the workshop in a structured series of steps: remembering (gathering stories of product use), imagining (brainstorming other possible use situations and assumed related use issues), structuring (deciding upon categories of related sticky notes), experiencing (exploring use situation scenarios in a role-play), targeting (creating priorities in what needs to be solved or exploited), envisioning (brainstorming solutions for the target) and questioning (reflection on the ‘knowledge gaps’ in the mind map).

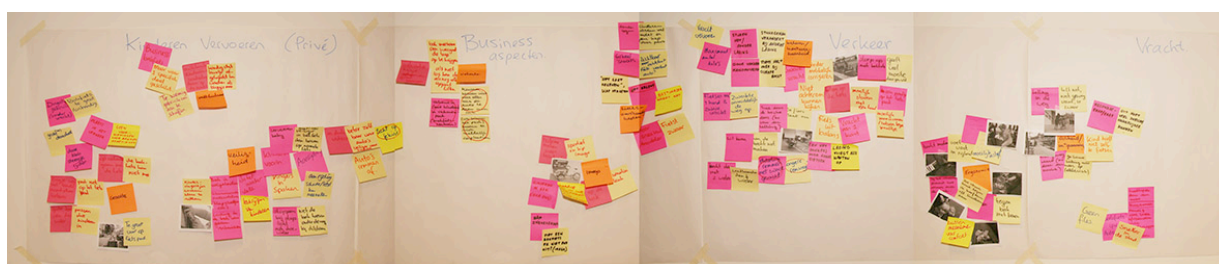


Figure 1: an example of the product use mind map created within the Envisioning Use workshop

2.2 Initial guidelines to design for dynamic and diverse use situations

The workbook describes that the product use mind map created in the workshop can serve as a first frame of reference of product use to apply in the rest of the design project. While this product use mind map has a prescribed structure, the format of other frames of reference of product use is at this point still open for exploration. However, it should at least contain an overview of possible use situations and related use issues. Furthermore it should contain a target that defines which use situations and issues will be taken into account in this design process. Designing for dynamics and diversity in use situations requires the following design activities:

- Use situation analysis: analyzing which users and contexts of use the product could possibly encounter and what different situations require from the product

- Use evaluation: anticipating what will happen when a designed product will encounter those situations by evaluating (early) prototypes
- Solution generation: creating solutions to fit the different use situations
- Decision-making: deciding which use situations will be targeted and which issues within these use situations will be addressed. Deciding which solutions to choose.

The design activities relate to the frame of reference in different ways. ‘Use situation analysis’ is used to create and update the frame of reference. ‘Use evaluation’ applies the frame of reference by taking the described use situations as test conditions and by translating use issues into research questions. The result of the evaluation can also be used to update the frame of reference with new issues. Solution generation uses the frame of reference as inspiration. Finally it is used in team decision-making as a shared frame of reference for communication.

Because it is impossible to predict in advance the full spectrum of situations a product will meet and which issues will arise during this encounter, the process of design for DDUS has a strong iterative character. Anticipating use situations and related issues will be achieved by gathering ‘stories’ of use of comparable products and by confronting early solutions with use situations in use evaluations. In those confrontations it will become clearer what important issues and use situations are. This will give new input to targeting and solution generation which in turn will give new solutions to confront with the frame of reference. The frame of reference itself therefore has a dynamic character: it evolves during the design process.

Apart from the basic principles of the guidelines described above, the initial workbook described a number of existing techniques for ‘use situation analysis’ and their benefits and limitations. Because the focus of the workbook was on the application in use evaluations, it furthermore described in more detail how the frame of reference of product use could be applied in those use evaluations. Less guidance was given on its application in solution generation or communication. Finally some suggestions were given on possible formats for the frame of reference such as a digitized form of the product use mind map created in the Envisioning Use workshop and scenario presentations such as narratives or storyboards. See [12] for a full version of the workbook.

3. Method

To evaluate the applicability and usability of the guidelines described in the workbook and to explore the format of the frame of reference of product use, a student project was set up to apply the guidelines to a design project. To simulate a realistic design context as much as possible a real client was asked to provide a design brief.

The research questions that will be discussed in this paper are:

- How was the frame of reference of product use created? What are the most useful activities in creating and updating the frame of reference?
- How was the frame of reference applied? Did it improve the external validity of use evaluations?

3.1 Set up

The guidelines were evaluated by students who participated in an elective course for the master Industrial Design Engineering of the University of Twente. To introduce the guidelines and the Envisioning Use technique, students were offered the initial workbook, as described in 2.2. Further instructions on the use of the guidelines were given in a lecture. The Envisioning Use workshop was taught in a tutorial in which the students applied the complete workshop, facilitated by the researcher, to a fictive case. The students received weekly coaching by the

instructors and the client gave feedback concerning the result of the project in an intermediate and final presentation session. The project was executed in about 140 hours (5 European credit points) within eight weeks.

3.2 Case

Four teams of five students participated in the project. The case was offered by the Dutch company ‘Bongo Innovations BV’ and considered the redesign of a carrier bike, which is a bike with a large box at the front, which is currently mainly used in the Netherlands by parents to transport their children. This case was chosen because its use situations contain many dynamic and diverse aspects such as roads and weather conditions, age and size of children, other luggage to transport, parking space etc. At the time of the project (spring 2011), Bongo was about to introduce their first carrier bike to the market.

3.3 Data gathering and analysis

To answer the research questions, insight was needed in the design *process*, particularly how use situation analysis and evaluations were used to update the frame of reference and how the frame of reference was used to set up evaluations. This could be partly derived from studying the *results* of the design process in a portfolio that students were explicitly asked to create. The portfolio showed both the evolution of the design solutions as well as of the frames of reference of product use. Furthermore students were asked to keep a log of their design activities, and write brief reports of each use situation analysis or evaluation activity. Finally students were asked to write a short process evaluation after the project in which they reflected on the project and the application of the guidelines. An additional group interview was conducted to confirm and complete the insights from these studies.

To analyse the design process, insights from the log, portfolio, analysis reports and written process evaluation were used to generate a summary of the approach of each team. Then, a group interview was set up to firstly confirm this analysis and where necessary fill in gaps in the information. The interview was transcribed completely. Finally, relevant sections of the transcripts and written process evaluation were identified and assigned to the research questions.

4. Results

Although the results from all four teams were included in data analysis, we only summarize the general results of two teams here, which will be used hereafter to illustrate the answers to the research questions. Team 1 initially chose to focus their design project on a use situation domain that was suggested by the client: using a carrier bike at holiday parks by the employees (cleaners, catering, technical service) to transport their tools or goods to and from cottages and other park buildings. The team found out at their first verification step that this target market was not interested in using a carrier bike for this purpose. They then chose a new target use situation, which concerned a carrier bike to rent to parents on vacation in holiday parks to transport their children in and around the park. The main issue they focused at in their solution is to make the bike particularly attractive for children so they could persuade their parents to rent the bike (Figure 2a).

Team 1 created five consecutive versions of a frame of reference in a mind map format, illustrated by collages of the use context. The frame of reference was updated after each analysis or evaluation study and after each workshop and/ or change of target. For example, when they decided to change their target to rental to holiday park visitors, they explored which issues would be important for this use situation by means of a scenario analysis and added these issues to the frame of reference. A selection of the resulting target mind map is shown in figure 2b.

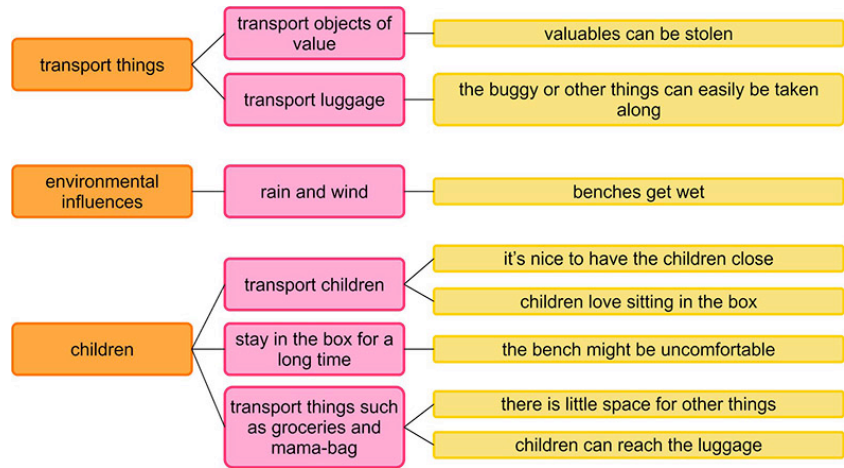


Figure 2a: team one's design for a carrier bike to rent at holiday parks to families, and Figure 2b: selection of the mind map of team one created after a change of target, with use situation aspects (pink) and use issues (yellow).

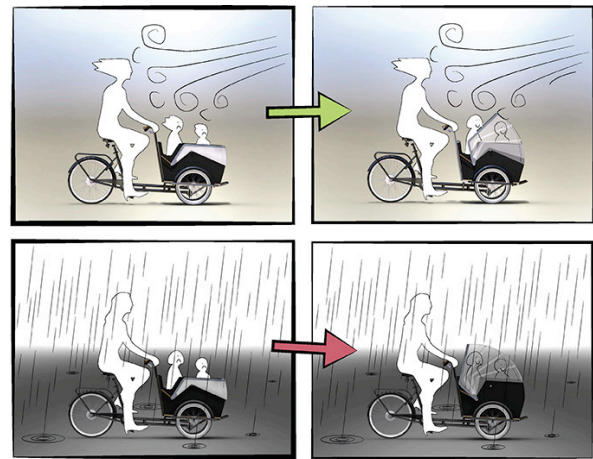


Figure 3: team two's design for a carrier bike with hood to use in different weather conditions while keeping contact between parents and children

Team 2 chose the situation in which carrier bikes are currently mainly used: to transport children in the city by parents. They initially focused at the design of a carrier bike that can be adjusted to the changing physical and emotional needs of growing children. Although parents were interested in this concept, they had to focus on a more specific issue to be able to finish their project within time. This issue concerned the different weather conditions in which the bike is used. Their final design solved this issue by means of an adjustable hood that allowed children to look around and allowed parents to keep contact with the children (figure 3).

Team 2 created four versions of the frame of reference in a mind map format and used storyboards to show the connection of their solution to the use situation. They updated the frame of reference after each workshop or brainstorm and before the first presentation session. The first two versions were aimed at family issues in general, a third one aimed at the ages of children and a fourth one aimed at different weather conditions (figure 4b). The consecutive frames of reference were added to one poster representation to show the connection between the different frames (figure 4a).

4.1 Creation of the frame of reference of product use

The first research question concerned how the frames of reference were created. All teams created a first frame of reference in the Envisioning Use workshop. Subsequently, use situation analysis techniques such as consulting

literature, consulting online forums, user interviews and online surveys were used to gather new insights or confirm assumptions. What is important to notice here is that information could only be added to the frame of reference when it was connected to particular issues concerning the product. For example team 2 conducted a literature analysis of children's changing thinking level, physical and social abilities and interests. To be able to use this information in the design process, it first needed to be explored if these characteristics would have any relevant influence on the use of the carrier bike. Therefore they executed an extra envisioning use workshop to connect those characteristics to bicycle issues. One of the resulting issues they added to their frame of reference was that younger children want to keep visual contact with their parents and therefore sit face backward, while older children want to sit face forward to be able to look around.

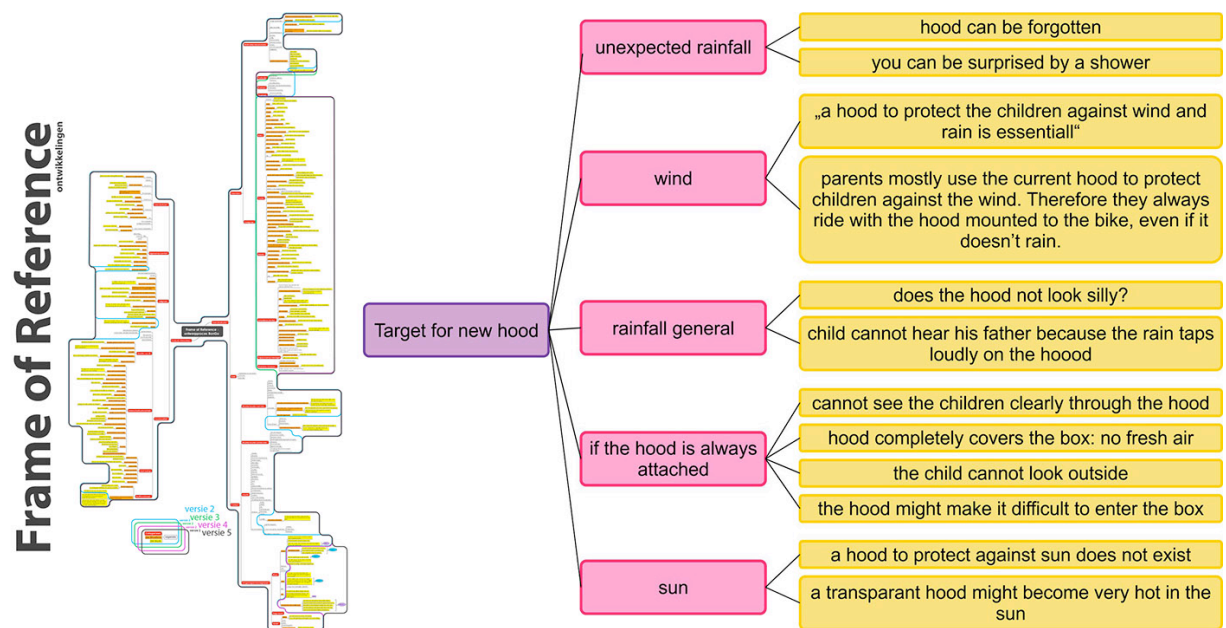


Figure 4a: the complete frame of reference of team 2 in a mind map poster format and Figure 4b: a selection of the mind map aimed at a hood to use in different weather conditions.

On the other hand some types of analyses gave directly insight in how certain usability issues related to a use situation, for instance quotes from online review forums were used for this purpose: “riding the bike with four children and a lot of groceries [use situation] is not heavy when you use an electric powered bike [use issue]”. This connection between use issues and use situations is necessary to be able to select relevant test conditions for use evaluations. A simple example is that when you want to evaluate the preferred position of children in the box, it is important to include children of different ages.

Apart from the initial workshop, other ‘internal’ activities were employed to explore use situations and how they connect to use issues. Internal activities concern techniques that rely on assumptions because no end-users or other evidence is used to confirm the use issues. These techniques included different versions of the Envisioning Use technique. Three teams applied the workshop also in later stages to share newly acquired information and link it to case specific issues or to imagine issues for a newly defined target. The first purpose is illustrated in the example of the preferred position of children of team 2 described above. The latter purpose can be illustrated by an example of team 1 who executed a new workshop to explore the issues related to the newly defined target group. Apart from the workshop, scenario analyses were used to explore use situation – use issue relationships, in which scenarios were written and explored individually or in a group, as explained by the following students:

Student A (team 1): “we used the scenarios to create the mind map and then we worked with the mind map” [...]

Student B (team 1): “yes, we all wrote scenarios and from that we derived a couple of use issues”

While the explorative activities were used to add issues to the frame of reference, use evaluations turned out to be very important to verify those issues. Team one lost some time because they initially targeted the holiday park employees who turned out not to be interested in the carrier bike. The idea was to have the bike used by for example cleaners and technicians to transport their tools from one cottage to another. They then built a frame of reference of product use, based on assumptions from a workshop and a scenario analysis. However, in an interview it turned out a carrier bike was not considered desirable by the holiday park managers, because it was too large and inflexible for the cleaners and too small for the technicians’ tools. This shows that verification of assumed issues should be done as soon as possible to prevent loss of time.

Evaluations did not only lead to verification of assumptions, but also resulted in new issues and related use situation aspects. For example, when team 1 showed their sketches of carrier bikes for a holiday park to parents, parents indicated that children with different interests might be more or less attracted to the selected theme for the appearance of the bike.

When we consider how the above-mentioned activities were used to create the frame of reference, it can be concluded that ‘use situation analysis’ is only useful for an update of the frame of reference when it explores use issue – use situation relationships. Both the internal as well as the external explorative activities resulted in a large addition of new issues. The evaluative activities also added new issues to the frame of reference, but were particularly useful to verify issues or use situation aspects.

4.2 Application of the frame of reference of product use

Team one used the frame of reference in their user test to decide upon the test conditions, for example different aged children and children with different interest were selected to participate. It was not possible to do the test at a holiday park, but the most important use situation aspect, that children and parents walk around together, was simulated by going to a school when it was out. The frame of reference was also used to set research questions by selecting the most important issues that they wanted to have confirmed, for instance ‘children are not interested in the theme of the box’. One of the other teams, team 3, based their test conditions and research questions on the explicit frame of reference as well.

Team 2 selected less focused test conditions. Their set up was rather opportunistic in that they chose a place to test the prototype of their design for a hood at which they were not sure they could find parents that have experience with riding a carrier bike in different weather conditions. The team eventually only interviewed four passers-by who had no experience with carrier bikes. Their research questions concerned only two higher-level issues: perceived appearance and functionality. The fourth team neither used their explicit frame of reference to set up their evaluation. Their research questions were also rather high level. However, their test conditions did correspond with the description of the target user and environment, which they had defined earlier in the project.

As mentioned above, questions in the frame of reference were used to guide use *evaluations*. Questions were used to guide use *situation analyses* as well. They could be based on the questioning step in the Envisioning Use technique or on scenario analysis. Team 1 kept the questions explicit in the frame of reference and executed different types of analyses to get them answered. For example, they made assumptions and connected questions

with regard to renting bicycles explicit in their frame of reference after doing a scenario analysis for this target, for example ‘would parents rent a bike at a holiday park?’ This question was later answered by interviewing parents.

Team 2, who did not use the frame of reference in their final evaluation, indicated they did not apply the frame of reference, particularly due to the mind map format they used:

Student (team 2): Eventually the frame of reference is something we only made ‘for the course’, and not something we experienced as a convenient tool to structure the process [...]. Without an explicit frame of reference it would probably be even more difficult to keep an overview of all relevant issues and situations, but if a more usable way could be found to visualize the frame of reference, the method would definitely benefit.

So although they used the same kind of format as team 1 for their frame of reference, they did not experience it as valuable for their design process.

Comparing the results of team 1 and 2 indicates that the frame of reference supports setting up test conditions. Conversely it cannot be concluded that the test conditions cannot be set without the frame of reference, because team 4 set up a realistic test environment without explicitly using the frame of reference. Apart from using the frame of reference to set the test conditions, the results suggest that research questions are more focused when the frame of reference is used. The two teams that did not use the frame of reference to set up their use evaluations, defined research questions that were less focused than the research questions of the teams that did use the frame of reference in doing so. In general the explicit frame of reference was not used enough according to some students.

4.3 Thinking in use situations

An unexpected result of the projects was that students indicated that the approach was particularly strong in getting the knowledge in the head and thereby taking it into the design process.

Researcher: “how did this project differ from other projects? User centered design is not new for you

Student A (team 2): that’s right, but usually a lot later, only when you have a solution and you do a user test [...], but not from the beginning.

Student B (team 2): yeah, now you design more for them, you are really from the beginning, with the workshop and all that, in your mind dealing with use situations and issues.

The importance of this mindset or implicit frame of reference can be seen in the work of team 2. They executed multiple workshops to explore use situations and issues, but they acknowledged they did not really use the explicit frame of reference. However, their solutions are clearly based on the issues that resulted from these workshop sessions. For example the issue ‘keeping contact with children while protecting them from different weather conditions’ is clearly integrated in their solution of a hood. This mindset was created by exploring issues in internal activities such as ‘imagining’ in the Envisioning Use workshop. Apparently this leads to both an addition of use issues to the explicit frame of reference, as well as to a mindset that supports solution generation.

5. Discussion

5.1 Exploring use situations

The initial workbook distinguished the design activities ‘use situation analysis’ and ‘use evaluation’. The study shows that it is important to connect use issues to use situations in the frame of reference if you want to use it to set up evaluations. Therefore, in the creation of the frame of reference it is important to explore how use situations

and use issues are connected. The term ‘use situation analysis’ in the workbook suggests that use situations can be analyzed independently of use issues. However, the relevance of use situations can only be defined when it is clear what influence they have on use issues. Although the explanation of the activity in the workbook mentions that ‘to get insight in ‘discriminating situation aspects’ it is necessary to connect them to use issues’, the term and explanation may have caused confusion.

Therefore it seems appropriate to replace that term in the guidelines by ‘exploration’ (rather than ‘analysis’) of use situations. Internal exploration techniques can lead to a quick generation of assumed issues, which can be verified later. The imagining step in the Envisioning Use technique can be used for this purpose. Scenario analysis is another means to achieve this goal. As Carroll [2] already concluded, scenarios evoke reflection about design issues. This was confirmed by the results of the teams that employed scenarios for this purpose.

To gather facts instead of assumptions on use situation aspects and issues, ‘external explorations’ can be conducted such as reviews of competitor or previous products. Those activities differ from use evaluations in that they do not consider evaluation of solution representations such as prototypes. They are explorative when open questions are posed, but can also be used to verify issues that result from internal exploration activities. Questions posed concern experienced use issues with regard to competitor or preceding products (e.g.: ‘are you able to talk with your children in your current carrier bike when it is raining?’) or anticipated needs for future use situations (‘would you rent a bike at a holiday park?’).

Because in explorations we distinguish internal and external activities in relation to resulting assumptions and facts, this division can be made for evaluations as well. As mentioned above, verifying assumed issues for future solutions in external evaluations is important. In early design phases it is also useful to base use issues on internal kinds of evaluations, such as testing yourself or testing with colleagues or family [10], even if these evaluations only lead to assumptions. This study does not give direct evidence that the frame of reference was updated based on these kinds of evaluations. Moreover, it did not show that the frame of reference was used reciprocally to contextualize those internal evaluations. Since some students indicated that they did not use the frame of reference for evaluation purposes, or did not use it enough, it can be concluded that this main goal of the frame of reference needs more explanation in the workbook.

Based on these conclusions, a new model of design activities related to the creation of the frame of reference was developed and is shown in figure 5. The main distinction with the initial guidelines is that internal and external activities are distinguished to highlight the differences between the two with regard to resulting assumptions and facts. Furthermore the term ‘exploration of dynamic and diverse use situations’ is introduced to stress the importance of connecting use situations to use issues.

5.2 Creating a shared vision on product use

Apart from the explicit frame of reference, the results clearly show the importance of the implicit frame of reference, or mindset that is created during the design project. Since one intended goal of the explicit frame of reference was to improve the ‘extent to which product use information is shared’, the implicit frames of reference should be aligned as much as possible to result in a common mindset or ‘shared vision on product use’.

A shared vision on product use is necessary to make well-founded design decisions. The assumed influence on the extent to which product use information is shared was expected to result from the extent to which the frame of reference was made explicit. However, the study did clearly show that the mindset and consequently a shared

vision were positively influenced directly by doing the workshop, without the necessity of keeping an explicit frame of reference. Our analyses of the application of the Envisioning Use technique in professional design practice [11] already showed that the interactive character of the workshop supports creating a shared vision on issues that are important in the design process.

This means that when new information about product use becomes available during the design project, this information could be added to the shared vision by means of either an update of the explicit frame of reference, or a jointly executed explorative activity such as the Envisioning Use technique. Integrating the knowledge transfer in a workshop allows at the same time for a further internal exploration of the newly gathered information.

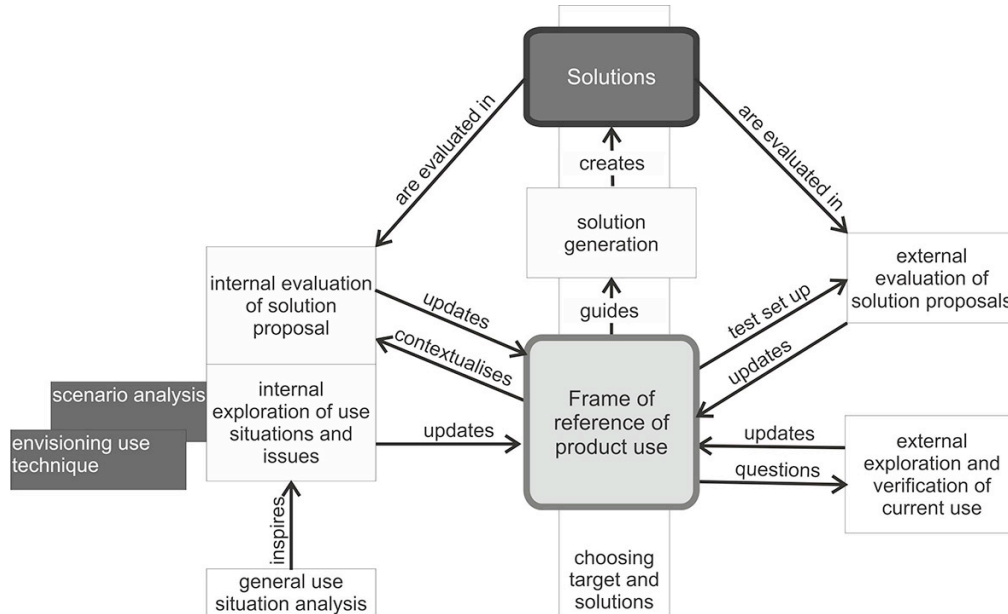


Figure 5: model of design activities connected to the frame of reference of product use in the amended workbook

6. Conclusion

This paper described a study in which we evaluated guidelines to take DDUS into account in the design process. The guidelines were aimed at generating and applying an explicit frame of reference of use situations and connected issues. From an application of the guidelines to a student project can be concluded that the explicit frame of reference supports setting both test conditions and research questions for evaluations. Furthermore, the frame of reference of product use can be created and updated by means of techniques which *explore* the relations between use situations and use issues or *verify* assumed relations. The explorative activities do not only result in an explicit frame of reference of product use, but in a mindset of DDUS as well. Jointly executed explorative activities such as the Envisioning Use technique consequently result in a shared vision on product use.

Based on these conclusions a new workbook was developed. The main differences with regard to the initial workbook are summarized in the following guidelines:

- Make all members of a design team aware of dynamic use and create a common mind set by having members actively work with information about use (Envisioning Use workshop)
- Explore use issues related to chosen use situations (scenario analysis, Envisioning Use workshop)
- Learn about future use from analysing current and anticipated experiences (external DDUS exploration)
- Use targeted use situations to set test conditions for use evaluations (external/ internal use evaluations)

- Use targeted use issues to set research questions for use evaluations (external/ internal use evaluations)
- Verify: verify assumed issues for future use situations (external DDUS verification and use evaluations)

Future research will be aimed at a further evolution of these guidelines based on an application and evaluation of the guidelines in other student projects and design practices.

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