Designing for Dynamic Usability: Development of
a Design Method that Supports Designing
Products for Dynamic Use Situations

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COMMON
GROUND

Designing for Dynamic Usability: Development of a Design Method that Supports Designing Products for Dynamic Use Situations

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Abstract: Ease of use or usability is gaining ground as a selling argument. However, designing usable consumer products still remains a complicated activity, particularly when products will be used in changing circumstances. The usability of a product is defined by ISO 9241 as the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use. From this definition can be concluded that a product's usability depends on the situation in which it is used and that this situation should be specified. However, more and more products are used by varying users, for varying purposes and/ or in varying contexts of use, for instance a vending machine or a mobile phone. These types of products therefore have a varying or dynamic usability. This variation can take place on different levels: within a use session, between use sessions or between products. The means by which a product can be adjusted to this variation or 'dynamic use situation' depends on the variation level. Products with dynamic use situations are difficult to design with regard to usability because it is difficult - if not impossible - to predict all situations a product will meet. Moreover, requirements from different use situations can conflict. In this paper we will elaborate on the principle of dynamic use situations by means of an example. Furthermore we will discuss the need for the development of a design method that supports designers in dealing with dynamic use situations. For that purpose we propose criteria the method should meet. Besides aiming at creating solutions these criteria include the analysis and prioritizing of use situation aspects as well as an evaluation in which these aspects are integrated. We believe scenarios can be a valuable tool in this process.

Keywords: Usability, User Characteristics, Context of Use, Industrial Design, Scenario Based Design

U SABILITY IS A design issue that is still gaining ground in design practice and research. Simplicity and ease of use are more and more used as selling arguments. However, many products still do not meet the expectations of the user with regard to usability. Classical examples of how products can frustrate users are shown by Donald Norman (1998). Other evidence for the importance of paying attention to usability in design is shown in the research of Elke den Ouden (2006) which shows that product returns are half of the time caused by the fact that people don't know how to operate their products and think it does not work.

The standard that deals with the ergonomics of human system interaction, ISO 9241(1998), defines usability as 'the extent to which a product can be used by specified users to achieve specified goals with efficiency, effectiveness and satisfaction in a specified context of use. Therefore, a product's usability is not only defined by the product characteristics, but also by the situation in which it is used. For instance, a mobile phone that has a certain level of usability for someone that uses it occasionally to call home from the car will probably have a very different usability when it is used by a teenager to send text messages secretly in a class room. When the actual use situation, including user, goal and context, of a product is known, its usability can be specified and measured in advance. However, in many cases the actual use situation is very hard to predict and is subject to change. For instance, Jordan (1998) states that users' performance with a product is likely to improve significantly in relation to tasks which they repeat with the product over time. Thus, he concludes, the usability of a product for a particular person completing a particular task may change very quickly as the task is repeated. Similarly usability may change for varying environments, goals or users. We call these varying situations dynamic use situations.

There are several difficulties a designer faces when having to design products for dynamic use situations. Apart from the fact that dynamic use situations are hard to predict, requirements from different use situations can conflict and the priority of these requirements is related to the solutions a designer develops.

The goal of this research is to develop a design method that supports designers in dealing with dynamic use situations. In this paper we will firstly elaborate on how dynamic use situations can affect usability by means of the example of a bicycle. Secondly, we will discuss the design problem that is caused by dynamic use situations and finally we

will propose the basic steps a designer could take to design solutions that accommodate dynamic use situations.

Dynamic Use Situations

We define dynamic use situations as the use situations of products that are used by varying users, with varying goals and/ or in varying contexts of use. Firstly, more and more products are used by varying users, because many services are being automated, such as box offices that are replaced by ticket vending machines and travel agencies that are replaced by online stores. Secondly, contexts of use vary increasingly as well. Growing wireless networks and improving battery capacity offer opportunities for mobile products that can be used in numerous environments. Moreover, aspects within environments such as objects, persons and information can be dynamic as well. Finally, the purposes that products are used for increase when more functions are integrated in one product, the most well-known examples being the Swiss Army knife and the Personal Computer. According to Norman (1999) multipurpose products are always complex: 'Try to make one device do many things and complexicty increases'.In some cases user, context as well as the goal of use are dynamic for example in the use situation of an automated museum audio tour which can be used by various museum visitors for multiple purposes (navigation or information retrieval) in various rooms of a museum. Figure 1 shows some examples of products with dynamic use situations.
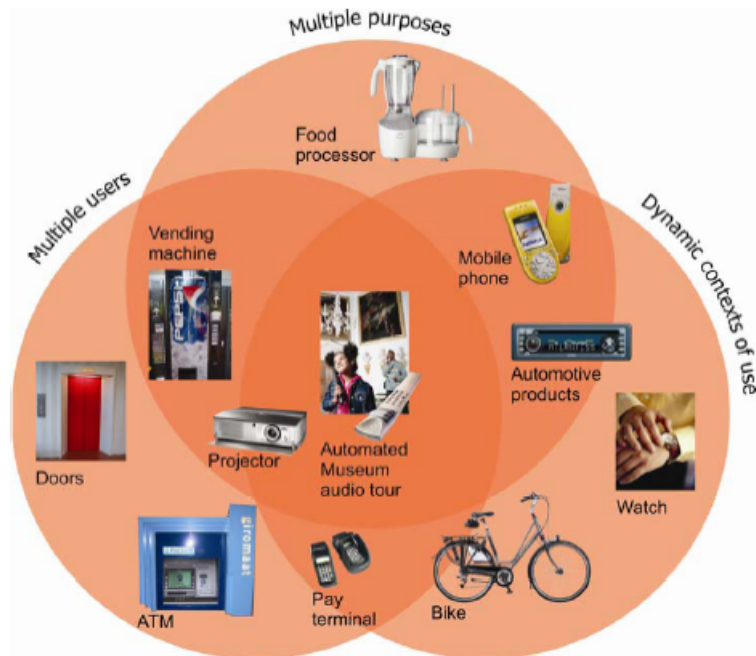

Figure 1: Examples of Products with Dynamic Use Situations

Dynamic Levels

The level on which use situation aspects vary seems to be a factor that influences the means by which a product design can accommodate different use situations. Three dynamics levels can be distinguished: within a use session, between use sessions of the same product and between products of the same series (figure 2). The session level contains aspects that vary during a use session, for example the environment aspect 'location' during the use of a GPS and the environment aspect 'products' during the use of a supermarket checkout. The product level contains aspects that vary between use sessions of a single product, for example the goal of using a ladder (cleaning or painting) and the user characteristic 'copying experience' and environment aspect 'provided original' of a copier machine. The series level contains aspects that vary between different products of the same series, for example loudness preferences of different users of a radio and the different appearances of environments in which it is used.
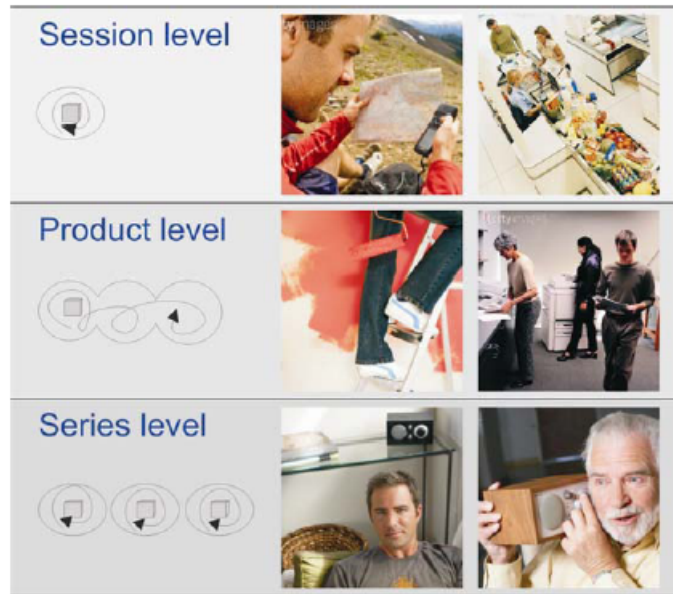
Figure 2: Levels on which Dynamic Use Situation Aspects can Vary

Example of Influence of Dynamic Use Situation Aspects

In summary, use situation aspects can be categorized by type: user, context or goal and by level: session, product or series. In this section we will explain the complexity of the influence of dynamic use situations on usability by means of an example, a bicycle (figure 3). This figure shows a couple of user, environment and goal aspects and their dynamics on different levels and a specific solution to accommodate the concerning aspect or combination of aspects.

Relating Use Situation Aspects to Usability Issues

To be able to take a use situation into account in a user centered design process the designer needs to know which aspects of a product's use situation influence usability. However, usability is quite a broad term and covers many issues such as user comfort, learnability, safety and expert efficiency (see for example Han et al. (2001)). To be able to distinguish the most relevant aspects it should be clear how a certain aspect influences a specific usability issue and which issues are most important, in other words what are the usability objectives. For instance, in case of a touring bicycle the issues comfort and safety will probably be most important, but in case of a racing bicycle the issue efficiency with regard to speed will be more important. The first type of bike requires a solution that offers users their preferred comfortable body position, the second type of bike requires a solution that offers the most aerodynamic body position. So in the first case the designer needs to know something about variation in preferences of users and in the second case the designer needs to know about expected air conditions and wind resistance of the equipment of the user. This means that the relevancy of use situation aspects depends on the usability issues that will define the success of a product.
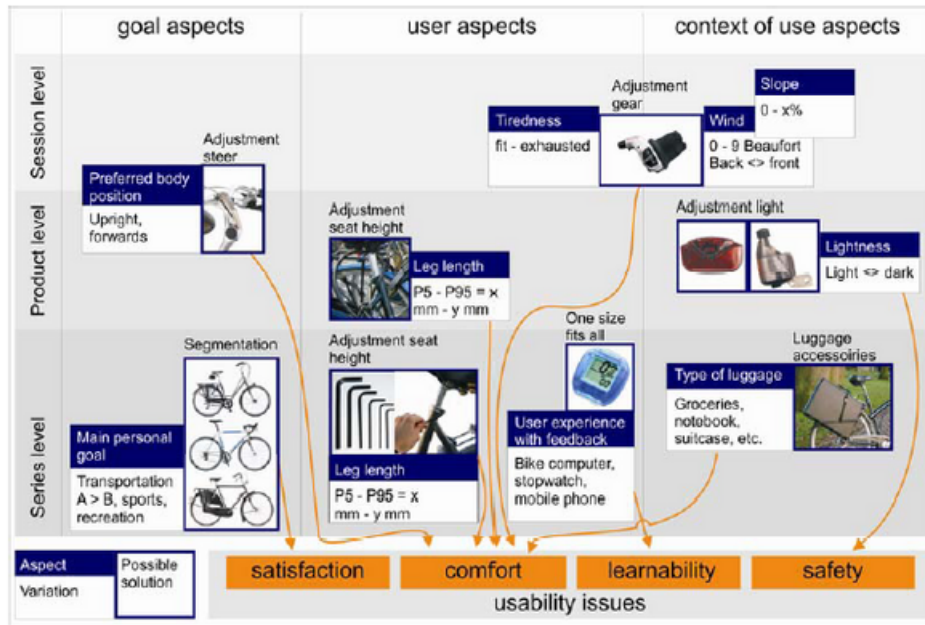
Figure 3: Some Dynamic Use Situation Aspects of a Bicycle

Accomodating to Use Situation Aspects

When we look at a bicycle and at the issue 'comfort' there are several varying user and context aspects that influence comfort, for instance leg length between users, preferred body position between sessions and wind and slope conditions within or between sessions. A bike design can be accommodated to these aspects in different ways. The gear can often be adjusted to wind, slope and the user's physical condition, the seat height may be adjusted to the leg length and the steer height or position may be adjusted to preferred body position. Note that in case of a personal bicycle, adjustment of seat height is usually not so easy. You need an extra tool for the adjustment. In case of a rented bicycle adjustment is much easier, usually by means of a fixed lever. In the last case the aspect 'leg length' varies frequently on product level while with a personal bicycle it varies on series level. Thus, the means by which a product feature accommodates variations of use as-

pects seems to depend on the dynamics level of the aspect. For instance, on series level, one can decide to segmentate to accommodate different use situations. Different bicycles can be developed for different personal goals. On product level a product can be tuned to its use situation by means of adjustable features and accessoiries. A customer can for example purchase accessories to be able to transport different types of luggage. On session level products could apart from easy adjustable features like gears also include more or less dynamically adaptive features, for example a bicycle computer that adapts to speed. On all levels the cheapest solution is usually 'one size fits all'. This is one solution which attempts (more or less deliberately) to accomodate all variations of an aspect. For instance, a door's height can be designed for p95 of length of users while all shorter persons will still be able to use it comfortably as well. Figure 4 shows how products in general can accommodate variation of use situation aspects on the three levels.
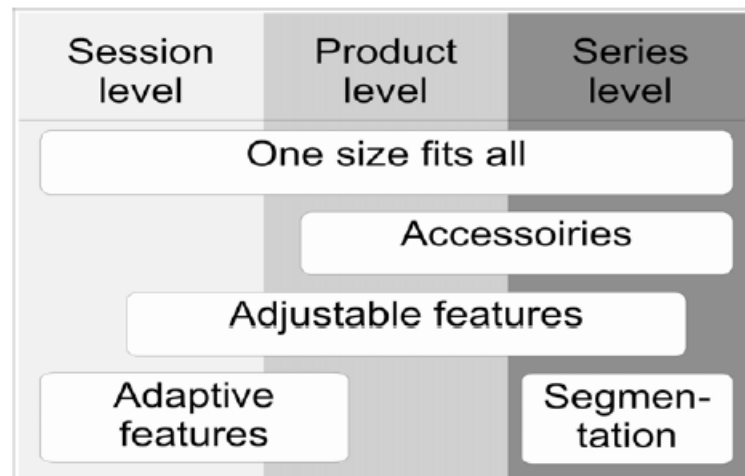
Figure 4: General Solutions to Accommodate Use Situation Dynamics on the Three Levels

Usability Relevance Depends on the Solution

One of the difficulties of mapping relevant use situation aspects is that their relevancy with regard to usability depends on the type of solution. This is consistent with the general notion that designers explore and define problem and solution together (Lawson 2006; Cross 2007).

As an example consider the issues comfort and safety and using the breaks of a bicycle. When we choose a solution in which the breaks are controlled by hand, the user aspects 'hand power' and some anthropometric hand data are relevant. However, when we choose a solution in which the breaks are controlled by feet, the hand aspects are no longer relevant. Instead the aspects 'experience with pedal breaks' and 'available learning time' might become more relevant. The more relevant a use situation aspect with regard to usability, the more a designer should attempt to accommodate the aspect in a solution and the more a designer should rely on accurate data instead of assumptions about the aspect and its dynamics to be able to design a solution that is successful with regard to the chosen usability issue.

Interdependency of Use Situation Aspects

Apart from depending on the solution, relevancy of use situation aspects with regard to usability in many cases also depends on other aspects. For instance, consider solution characteristics as gear adjustment and offered body position as well as environment aspects wind and slope and the user aspect physical condition. All these aspects contribute to the usability issues comfort and effort experienced by the user.

Design Problem

The example of the bicycle shows the complexity of designing for dynamic use situations. Many use situation aspects can influence different usability issues and thereby the most suitable solution. The usability relevancy of use situation aspects depends in return on the solution as well as other use situation aspects. Moreover, apart from these aspect structuring difficulties, the design process is complicated by the fact that it is difficult, if not impossible, to predict all actual use situations that a product will meet, particularly when a product is new to the market. This is underlined by Redström (2006) as well who concludes that there will always be, to various degrees, a difference between the intended use that governs the design process and the eventual use of the resulting design.

The bicycle has a long history. A usability oriented design process has in this case the advantage that a lot of knowledge about bicycle's use situations is already present in bicycle developing companies and can be relatively easily retrieved by conducting benchmark studies and field tests. However, when a design is a new type of product this knowledge is not available or easily retrievable. From this we can conclude that to be able to design for dynamic use situations a designer needs a means to retrieve an adequate view on use situations that a product will meet and a means to structure dynamic use situation aspects. These means could then provide a frame of reference on which solutions could be evaluated.

This research aims at providing such a means to designers. We believe that a structured design method could support designers in dealing with dynamic use situations. In the next section we propose the steps a designer needs to take to be able to create products that accommodate dynamic use situations

and discuss how a method for dynamic use situations could support the designer in this process.

Development of a Design Method for Dynamic Use Situations

In an earlier study (Brouwer and van der Voort 2006) we stated that a method which supports designing for dynamic use situations should include activities aimed at creating solutions, creating a frame of reference and evaluating those solutions. Below we will discuss the activities for those design phases and how a design method should support those activities.

Supporting Activities for Building a Frame of Reference and Evaluating Solutions

As stated above, building a frame of reference for evaluating solutions on dynamic use situations is difficult because it is complicated to predict future use situations and it is very difficult to structure relevant dynamic use situation aspects. The designer is faced with a lot of uncertainty. When investigating this issue in other domains we found (Brouwer and van der Voort 2006) that in planning strategies one has to deal with similar uncertainty. A valuable method that supports people in planning strategies is scenario planning (Heijden 2005). The basic steps of scenario planning can serve as a basis for creating a frame of reference for evaluating solutions for dynamic use situations.

When an organization needs to make a decision about a strategy for an uncertain future it can benefit from the by now matured method of scenario planning that was pioneered by Herman Kahn (1962). Researchers that advocate scenario planning claim that instead of reacting to uncertainty with denial people should be willing to look ahead and consider uncertainties. In scenario planning this is achieved by creating and reflecting upon scenarios. In this context, scenarios are defined as a tool for ordering one's perceptions about alternative future environments in which one's decisions might be played out (Schwartz 1991).

Scenario planning is based on focusing on the future, investigating the issues surrounding that future and identifying the forces that drive those issues. The most important predetermined and uncertain driving forces are then used to build integrated scenarios to reflect upon decisions. This can be useful

for designing for dynamic use situations as well. In a dynamic use situation the certain factors are factors that count for all use situations, such as usability principles derived from cognitive psychology and use situation aspects of which its probability of occurrence can be predicted, such as anthropometric data. The uncertain factors in dynamic use situations are use situation aspects that are hard to predict such as variation in experience with comparable products or distracting elements in the environment.

Both important certain and uncertain driving factors should be combined to build frames of reference to reflect upon a design. In this way the certain factors are not overlooked while at the same time considering important uncertainties. Uncertain factors should be prioritised on their impact on usability to avoid that the designer gets overwhelmed by a problem representation that is too complex.

From aforementioned arguments and the example of the bicycle can be derived that a design method that supports designers in dealing with dynamic use situations should firstly make the designer aware of the importance of focusing on possible future use situations. A usable design requires that the designer is motivated to acknowledge the importance of use situation factors that influence usability. Secondly the method should support the designer in activities that consider building a frame of reference and evaluating solutions. These activities include:

Supporting Activities for Creating Solutions

Although the support for activities for creating solutions is mentioned here separately, the example of the bicycle already showed that the frame of reference to a large extend depends on solutions. Therefore both the frame of reference and representations of solutions should be easy to adjust; they should have a flexible character. Furthermore the method should support an iterative process in which the frame of reference and solutions are developed in parallel. We also believe that the application of techniques that stimulate creative thinking can contribute to creating appropriate solutions. Particularly offering the designer the opportunity to immerse himself in the use situation such as proposed by Buur and Bødker (2000) seems an interesting technique to support the creative process of creating solutions.

Table 1: Criteria for a Design Method that Supports Designers in Dealing with Dynamic use Situations

#		Criterion
1		The method should make designers aware of the importance of focusing on possible future use situations to be able to design a successful product with regard to usability.
2		The method should support designers in structuring activities that are needed to build a frame of reference and evaluate solutions.. These activities include:
	A	Exploring usability issues surrounding future use situations
	B	Exploring and analysing solution relevant use situation aspects and their variation including user characteristics, goals and context of use.
	C	Ranking important (critical) and uncertain use situation aspects.
	D	Integrating important predetermined and uncertain aspects in reflection.
	E	Reflecting on multiple use situations
3		The method should offer a flexible frame of reference that is easy to adjust
4		The method should offer a flexible representation for solutions
5		The method should support an iterative design process
6		The method should allow designers to apply creativity techniques
7		The method should allow the designer to immerse himself in the use situation to support the creative process
8		The method should offer design representations that are easy to communicate
9		The method should offer frame of reference representations that are easy to communicate
10		The method should be efficient and easy to learn
11		The method should make the decision process explicit allowing everyone on the team to understand decision rationale and reducing the possibility of moving forward with unsupported decisions.
12		The method should act as a checklist of the key steps
13		The method should be self-documenting by creating a record of the decision-making process for future reference and for educating newcomers

General Criteria for Design Methods

As for every design method the method aimed at dynamic use situations should deliver design and frame of reference representations that can easily be communicated to other stakeholders. In addition, the method should be efficient which means it should be easy to learn and should not take much time to apply. Furthermore, from Ulrich and Eppinger (2000) can be derived that a structured design method should firstly make the decision process explicit, allowing everyone on a design team to understand the decision rationale and reducing the possibility of moving forward with unsupported decisions. Second it should act as a 'checklist' of the key steps in a development activity to ensure that important issues are not forgotten. Third it should be self-documenting by creating a record of the decision-making process for future reference and for educating newcomers.

Table 1 summarizes all criteria that the design method that supports designers in dealing with dynamic use situations should meet.

Available Design Methods

Based on literature, we studied a couple of current (user centered) design methods and techniques and compared them to the above defined 'criteria' (see also Brouwer & van der Voort (2006)). This evaluation will give more insight in which elements of methods can be valuable in a design method for dynamic use situations.

Specification Analysis

Translating a desired use situation into technical and functional specifications risks losing the grounds of these specifications (Miedema et al. (2007)). A designer might forcedly create solutions that fit the specifications instead of suiting the future use situation. Therefore specifcation analysis does not meet the criterion of focus on the future. Furthermore specifications only consider testable and therefore quantitative driving factors such as physical user requirements, thereby ignoring qualitative data such as user experience with comparable products.

User Testing

User tests or usability tests (see for example (Rubin 1994)) are commonly used as a technique to develop products with high usability. In a user test working prototypes are tested by specified test persons on specified tasks in a laboratory or in the field. They score well on a focus on the future use situation, exploring usability issues surrounding this future use situation (the research questions) and providing integrated reflection. However, user tests do not reveal important uncertain, variable use situation factors that influence usability, since they only test in specified conditions and leave little room for varying these conditions. Furthermore they are limited in reflecting on multiple use situations. User tests in addition do not directly support the designer in the creation of solutions. The required prototypes are not flexible and will only be available when detailing the design.

Personas

Personas are hypothetical archetypes of actual users (Cooper 1999). Relevant personas and their goals are determined in a process of successive refinement during the initial investigation of the problem domain. Cooper states that you will find that the facilities that please some users will interfere with the enjoyment and satisfaction of others. Therefore he suggests designing for one 'primary' persona. This technique scores well on making designers aware of focusing on the future, exploring usability issues and analysing user characteristics and goals. However, they do not support analysing the context of use. A positive aspect with regard to dynamic use situations is that it integrates both certain and uncertain aspects in reflection by completing the personas with uncertain characteristics. Their realistic appearance allows designers to 'immerse' themselves in the user. Completing this technique with the application of scenarios (see next section) allows the designer to reflect on multiple use situations, although the advice to design for one 'primary' persona might suggest

the opposite. Cooper advises to develop a cast of personas. The design for the primary persona should not interfere with the needs of the other personas. This can only be realised when solutions are evaluated on multiple personas.

Scenario Based Design

In scenario based design (Rosson and Carroll 2002) descriptions of people using technology are used in discussing and analysing how technology could be reshaping their activities. Use situation aspects are integrated in flexible design and problem representations and therefore the method meets most evaluation criteria. However, until now these methods are mostly aimed at software engineering. In this application domain the target group is often well known and the context of use is often relatively static. Therefore integration of uncertainty about the future use situation is limited in these methods. Although Rosson and Carroll do point out that sharing and developing scenarios helps to control the uncertainties of design work, they do not explicitly explain how this can be applied when use situations vary. The method as used within software engineering therefore does not meet the criterion of revealing and ranking most important and uncertain, varying driving factors.

Conclusion

This paper has discussed the complexity of designing for dynamic use situations. Firstly structuring the design problem to create a frame of reference is difficult because usability issues, use situation aspects and solutions are interrelated. Varying use situation aspects result in varying usability levels with respect to effectiveness, efficiency and satisfaction, where as the relevance of these use situation aspects depends on the solution that is chosen. Secondly future use situations are hard to predict, because where, how and for which purpose a product will be used is in the hands of the actual user.

The analysis of the uncertainty a designer has to deal with when designing for dynamic use situations and the comparison to scenario planning have provided criteria that a design method for dynamic use situations should meet. A brief assessment of available user centered design methods and techniques on these criteria shows that a design method that is based on scenarios offers opportunities to serve as a basis for such a design method. However, current methods should be extended with creativity techniques and attention should be given to supporting prioritization of dynamic use situation aspects.

Our future work will concentrate on developing and validating a scenario-based product design method for consumer products that meets all identi-

fied criteria for supporting designers in dealing with   dynamic use situations.

References

Brouwer, M. and M. C. van der Voort (2006). Design for Dynamic Use Situations, First Steps in the Development of a Design Method that Supports Designing for Dynamic Use Situations, *Proceedings of Wonderground 2006 Design Research Society International Conference*. K. Friedman, T. Love, E. Côrte-Real and C. Rust. Lisbon, Portugal, CEIADE.

Buur, J. and S. Bødker (2000). From usability lab to "design collaboratorium": reframing usability practice. *Proceedings of the conference on Designing interactive systems: processes, practices, methods, and techniques*. New York City, ACM Press.

Cooper, A. (1999). The inmates are running the asylum: why high-tech products drive us crazy and how to restore the sanity, Indianapolis: Sams.

Cross, N. (2007). Designerly Ways of Knowing. Basel, Birkhauser.

Han, S. H., M. Hwan Yun, K.-J. Kim and J. Kwahk (2001). "Evaluation of product usability: development and validation of usability dimensions and design elements based on empirical models." *International Journal of Industrial Ergonomics* 26(4):p 477.

Heijden , K. v. d. (2005). Scenarios : the art of strategic conversation Chichester etc. : Wiley.

ISO (1998). ISO 9241 - 11 Ergonomic requirements for office work with visual display terminals (VDTs) - Part 11: Guidance on usability. Geneva, Switzerland, International Organization for Standardization.

Jordan, P. W. (1998). An Introduction to Usability. London, Taylor & Francis Ltd.

Kahn, H. (1962). Thinking about the unthinkable, New York : AVON.

Lawson, B. (2006). How designers think; the design process demystified, Elsevier.

Miedema, J., M. C. van der Voort, D. Lutters and F. J. A. M. van Houten (2007). Synergy of Technical Specifications, Functional Specifications and Scenarios in Requirements Specifications., *The Future of Product Development: Proceedings of the 17th CIRP Design Conference*. F.-L. Krause, Springer**:** p 235 - 246.

Norman, D. A. (1998). The design of everyday things. London, MIT Press.

Norman, D. A. (1999). The invisible computer: why good products can fail, the personal computer is so complex, and information appliances are the solution Cambridge MA etc. : MIT Press.

Ouden, P. H. d. (2006). Development of a design analysis model for consumer complaints: revealing a new class of quality failures. *Department of Technology Management*. Eindhoven, University of Eindhoven. Doctoral degree.

Redström, J. (2006). "Towards user design? on the shift from object to user as the subject of design." *Design Studies* 27(2):p 123-139.

Rosson, M. B. and J. M. Carroll (2002). Usability Engineering: scenario-based development of human-computer interaction, Morgan Kaufmann.

Rubin, J. (1994). Handbook of usability testing. New York, John Wiley & Sons.

Schwartz, P. (1991). The Art of the Long View, Planning for the Future in an Uncertain World, Doubleday.

Ulrich, K. T. and S. D. Eppinger (2000). Product design and development, Boston: Irwin McGraw-Hill.

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