Visualizing Use Context with Picture Scenarios in the Design Process

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ABSTRACT
The context in which a device is used has a major impact on mobile device design. Despite this, there are few system design methods that assist user interface designers to represent use context in a useful and systematic manner throughout the whole design process. Current scenario-based design approaches are able to represent context, but still present a challenge to support a shared understanding of the rich context in which activities take place and in encoding dynamic use context due to time issues such as sequential and parallel actions. This paper reports on a method called Picture Scenarios. The method was used by four design teams whilst designing mobile information devices for use in a public square. Results show that picture scenarios provide an effective way of communicating and debating use context with design partners. The suggested format of the picture scenarios facilitates to represent use context during design activities in a systematic way. These scenarios are easy to create, easy to use, and capture important contextual details about activity that is difficult to represent otherwise.

Categories and Subject Descriptors
H5.2. User Interfaces: Theory and methods, User-centered design

General Terms
Design, Human Factors, Theory

Keywords
Picture Scenarios, System design methods, Use context, Mobile system design, Context representation, Scenario-based design.

1. CONTEXT IN MOBILE SYSTEM DESIGN
The role of context is critical to the design of interactive systems. With the proliferation of ubiquitous and embedded devices, context is an essential consideration in the design of modern technologies [1], [3]. In particular, we observe the importance of context in mobile devices that we carry “on person”, and which enable us to be connected to people and information resources. By context we refer to the aspects that impact on user activity such as social interactions, physical environments and personal motivations.

Context in mobile use is naturally dynamic and is perceived differently from one moment to the next. The constellation of contextual aspects has a complex influence on user activities that is difficult to capture. Users need to be supported by the right functionality in different situations. Accounting for these situations and their impacts on use is important as changing goals and needs of the user are only understandable by the underlying context. We are interested especially in these mutual interactions of user and context from a system designers’ perspective.

Understanding context is difficult; but making sense of context in a practical way for design is even more so. Other system design methods give context some role (e.g. [7], [8]), but its representation is often rendered as background phenomena and is not expressed in a focused or systematic manner. Some existing context descriptions simply seem to fulfil the task to generally enrich the description of the use situation to make it more realistic, some others are crucial in their specific occurrence to the use situation. Therefore, it is hard to use existing methods to explain the influence of the context on users’ activity in relation to device use. New methods are required that can capture user activities within this complex use context to support the development process of mobile systems and to raise the likelihood for usable and successful future design. In this paper we introduce a method for user interface designers to specifically capture use context systematically in mobile device design. We particularly focus on the perceived merit of our approach for designers using the method throughout the design process, with respect to the representation of use context.

2. REPRESENTING CONTEXT IN DESIGN
Despite that there is an increasing interest in exploring use context via ethnographic studies there is no clear understanding of the concept of context and how this information can be used in the design process. Recently there has been more literature [1], [3], [9] examining context on a theoretical level, to gain a better and broader understanding for use context to facilitate better system design. Dourish [2] points out four assumptions he sees as the main characteristics of context in mobile appliance use and their challenges on design. We concur that it is crucial to focus rather on what context does than what it is. His focus of context provides a strong activity orientation. His four assumptions are:

- Context is a relational property. What are the relations?
- The scope of contextual feature is defined dynamically. Context can not be defined in advance.
- Context is an occasional property. Context is not stable, but particular to each occasion of activity.

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• Context arises from the activity. Context is produced in the course of activity.

These considerations are seen as a basis for discussing important dimensions of context in mobile device design. While current literature tries to get an integrated view of the concept of context among disciplines we still see a lack of procedure to transfer this view and these conceptual considerations into design practice. It is this area in which our suggestions are targeted. We consider the last of the four assumptions to be the most crucial in our ambition to understand context for mobile system design. It provides us with a focus on user activities and therefore a possibility to narrow down our efforts to investigate and understand use context. We do not have to examine a plethora of contextual details, but are able to focus on mutual influence of activity and context.

The first three of Dourish’s assumptions helps us to define the interaction of activities and context in more detail. We start with the first assumption “context is a relational property”. Dourish points out that something may or may not be relevant to some particular activity. We agree with this. However what is the relational property of context? We suggest that time is one important factor that defines this relation in its different occurrences. According to Fabre and Howard [5] time does not only influence usability, but also the situation of use. Use context around activities also can be characterized by these dimensions.

Duration expresses how long an activity takes. From the length of an activity we also can make a determination regarding the sequence – the single steps that add up to the whole activity.

Location is an expression of a given point of time. That contextualizes activities with respect to the present and should give us information on relevant concurrent activities.

Contingency captures the historic and future possibilities and hence the constraints and interdependencies between activities. This time concept provides the possibility to discover iterations of similar recurring or occasional use patterns.

Frequency describes if activities occur frequently or infrequently. This time dimension allows us simply to count how often similar activities in a similar use context occur.

Our aim in translating these time dimensions into sequence of activity, concurrent, recurring and frequently occurring activities is to help designers to focus on important interactions of context and activities in a systematic manner. When we additionally take cognitive, social and physical aspects as single constituents of context into consideration, time should be able to explain the relation of these contextual aspects and how they occur, allowing us to discover patterns of use in certain contexts.

These time dimensions should also be useful in approaching the second and third of Dourish’s suggested assumptions in a systematic way. We agree with his assumption that context is defined dynamically. However, he takes an extreme stand in saying context can not be defined in advance. We assume there are sequential patterns that may be discovered in representing current use systematically. It is important to explore users’ past activities because it is a reliable source for predicting future use. We are able to express sequence and iterations that occur in these constellations. Also Chalmers points out that looking at temporal and subjective patterns in representing context for system design is promising [1]. This brings us to the third assumption, “context is an occasional property”. This means we need a high level of detail to capture all relevant information about specific use situations. We may then find that use patterns are not as occasional as Dourish suggests. In practice the designer, not the user, has to define the meaning of the key characteristics of context [1]. Therefore, designers need guidance on exactly how devices are used in current practice and methods that get a systematic handle on context. Summarizing the above mentioned challenges for a method that represents use context we need to focus on context according to subjective and temporal patterns of activity.

3. THE PICTURE SCENARIO METHOD

In regard to the considerations described above we developed a method using graphical vignettes or so called picture scenarios to represent use context. These are based on textual scenarios that are a flexible design tool and are known to be able to capture context and to take different perspectives on board [12]. Therefore, the used Picture Scenario Method combines firstly the classic textual scenarios in which narrative is enriched by context descriptions and quotations of social interactions based on ethnographic studies, and secondly, the concept of Personas [2]. The characters are introduced in a cast list of actors important to the scenario, and representative of the target user group. Important scenes are acted out in use context and photos are taken, according to a prepared storyboard for the Picture Scenario. Picture Scenarios use sequential art [4] as an integration format. This format not only enables the systematic coding of different contextual aspects such as social, cognitive and physical in the form of call outs, but also provides the possibility to express the former described time dimensions such as sequence, iterations and parallel actions of use. Additionally, an improved understanding of the use context throughout the design process is expected.

Figure 1. Part of Picture Scenario showing a parallel scene

As an example for a representation of co-occurring action, Figure 1 shows a section of a picture scenario that describes the communication between a couple who are organising the handover of their shared car. Figure 2 shows how different contextual aspects can be expressed in parallel using call outs. Putting several pictures into a storyboard allows us to express the sequence of activities. Using the method at different stages of the design process provides the possibility to describe current use and anticipated use. Participants of several design workshops gave positive feedback about the Picture Scenario Method [11]. For them this kind of visual representation was helpful in providing a shared basis for communication. In addition, the use of combined media such as text and pictures adds to the overall understanding and is suitable for current design practice in offering the possibility to express and trial out ideas within the context of use.
5. RESULTS

To summarise the results, all design teams considered that the time spent on creating the picture scenarios was valuable in gaining a higher level of understanding of the use context they were designing for. They judged the method to be efficient, spending between six to ten hours per picture scenario including storyboarding, taking the photos and putting them together. They also thought the method was easy to use. Figure 4 shows an example of fragments of the picture scenarios created by one of the design teams. Their chosen persona is ‘Ovi’ who visits Federation Square for the first time as an international tourist. The reported results regarding the merit of the picture scenarios is a summary of all four interviewed design teams.

5.1 Problem Picture Scenario

The upper row of Figure 4 shows selected pictures of the Problem Picture Scenario created in the requirement phase of the design process. According to the interview results, the teams discussed the Problem Picture Scenario to come up with a design idea that solved the problems within the environment. Generally, the pictures assisted the designers to see the context of the problems clearly and the situation in detail while they were not physically present at the square (e.g. picture 1). In addition, the picture scenarios allowed the designers to imagine the end use of the device more easily, which in turn assisted in discovering design requirements and in helping to bridge the design and requirements phases. For example with picture 2 the need for a different kind of view was expressed. The Picture Scenarios allowed the designers to refer back to the target user and his/her use context as a shared and agreed basis in team discussions. E.g. in saying “Ovi didn’t know what to expect in the building from outside” they were referring to picture 3. According to the designers, this would not have been possible with a textual scenario only. Conversely, restrictions were felt by the use of only one storyline and the need to justify this choice. The teams found it difficult in that they merely implemented some of the original ideas they came up with after their data collection. Although the tradeoff between open design possibilities and restrictions by the pictures could be seen as constraining it also can be stated that the established commitment to some specific problems in the picture scenario at an early stage can focus and accelerate the design process.

5.2 Picture Use Scenario

In comparison to the early picture scenario the Picture Use Scenario (see lower row of figure 4) served as an evaluation tool in placing the device in context. The photo sessions were described as “stepping through a real experience with a real user” (e.g. picture 4). This experience triggered much consideration regarding weaknesses in design solutions that the designers did not previously recognize and that required re-thinking and change. Furthermore, contextual details that were missed in the early design process, for example buildings hiding each other, were highlighted by the Picture Use Scenario and as a result the design team came up with the bird view and zoom function for the mobile device (picture 5). Insights were also gained while putting the pictures together with the refined design. For example, they could see the exact image the user would see on the interface at a particular point of interaction, giving the visual sense of standing in that environment and being the person using the mobile device (see picture 6). The design teams were clear that these advantages couldn’t be gained from textual scenarios or filmed scenarios. The latter ones cannot easily be cut into pieces or scribbled on.
6. CONCLUDING COMMENTS

The Picture Scenario approach is an easy to use systematic method that incorporates use context in the design process. While most methods which aim to represent use context for design are used at early stages of the design process (e.g. [8], [7]) the Picture Scenario Method provides the opportunity to keep the design focus on the context through to high level prototypes. Some recent visual approaches focus on context (e.g. Animated Use Sketches [6]), but creating these tends to be time consuming and often demands specific sketching or programming skills. Early design ideas can be described and discussed in the use context as an initial reality check. In addition to the representation of use context, Picture Scenarios support the discovery of requirements. The “acting out” process initiates a strong involvement with the context and important design issues. Finally, this approach effectively combines personas and conventional scenario based design methods in integrating the actors in the context of use. These scenarios are easy to create, easy to use, and capture important contextual details about activity that is difficult to represent otherwise. While Picture Scenarios focus very much on the real environment, new mobile device design might also have to consider the envisioned environment [6] in the way that the system not only changes use habits, but also the environment they are used in. The task for future research will be to consider this mutual influence in the Picture Scenario method.

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8. REFERENCES