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Understanding contexts by being there: case studies in bodystorming

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Abstract A thorough appreciation of physical, social, interactional, and psychological contextual factors is crucial in the design of ubiquitous computing applications. This paper investigates the benefits of a method called bodystorming for carrying out design sessions in the original context, ‘in the wild’, instead of the office. A location is selected that is identical or similar to the original environment. Innovation, carried out on-site, is based on ethnographical data presented as concrete design questions. Individual solutions to design questions are brainstormed and discussed on-site. Facets of data collection and preparation, formulation of design questions, selection of locations, session administration, and evaluation of design ideas are presented. We found that bodystorming permits immediate feedback for generated design ideas, and can provide a more accurate understanding of contextual factors. Bodystorming sessions were found memorable and inspiring. It is best suitable for designing for activities that are accessible and unfamiliar to the researchers.

Keywords Bodystorming · Brainstorming · Context-awareness · Ubiquitous computing · User-centered design

1 Introduction

1.1 Understanding contextual factors in ubiquitous computing

Mark Weiser, widely acknowledged as the father of ubiquitous computing, envisioned ubiquitous computing as a technology embedded in the physical environment, providing useful services without disturbing the natural flow of human activities [1, 2]. Ubiquitous computing would “fade into the background” and incorporate what he called “natural user interfaces”. Guided by this vision, researchers’ attention was drawn to the question of what detectable attributes of the context are important in making the user interface seem natural. Awareness of these contextual attributes was seen as a prerequisite for introducing ubiquitous computing products into everyday activities. Early research in context-awareness can be characterised as an attempt in finding universal context attributes that would be needed for many (or all) ubiquitous computing applications (see Pascoe et al [3]; for a critical review, see Dey [4]). Some attributes, such as location and time, were indeed repeatedly found important for many applications. Today, however, many researchers would agree that a more worthwhile approach is to determine the contextual attributes for each application individually (e.g. see Personal and Ubiquitous Computing (Vol 5 No 1) or Human-Computer Interaction (Vol 16 Nos. 2–4)). The overarching goal in the design of any ubiquitous computing application is, then, to discover the specific physical, social, interactional, and/or psychological contextual factors that are important in making the flow of human-computer interaction natural.

A variety of user-centered design process models have been proposed for this purpose [5–8]. All models subsume following three stages: (1) observation of user activities; (2) documentation of the observations; and (3) design based on the documentation. Data collection methods typically draw from anthropological and ethnographic research orientations (e.g. Emerson et al [9]), whereas documentation methods can range from story-like descriptions of actions (e.g. Cooper [7]) to systematic turn-by-turn ethnographic transcriptions of the event (e.g. Hutchby and Woolfitt [10]) to box-and-arrow diagrams depicting different aspects of the activity (e.g. Beyer and Holtzblatt [5]). The purpose of the two first stages is to provide enough information for the last stage to design the context-aware system. Within these models, the quality of design ideas crucially depends upon the quality of the documents.
During years of user-centered study, our research team has become aware of three consequential shortcomings. First, because studied activities are complex, documents representing this complexity, unless extremely carefully written, are long and complex. Without a substantial investment of time in studying documents, adequate understanding of context is not achieved within the design team. Second, because all documentation is based on interpretations of one individual, documents are inherently inaccurate or biased. As a researcher observes user activities, s/he already pays attention to some aspects while disregarding others. As observations are documented, meaningful interpretations are given and missing information is filled with prior knowledge about the phenomena. This reconstruction leads to omissions, irrelevancies, and distortions in documents. Thus, designs would too often be based on misconceptions of the problem domain. Third, it is often practically impossible to notice or correct these misconceptions without conducting another round of observation or documentation, or both.

1.2 Potentials of bodystorming

The primary purpose of this paper is to present and evaluate a possible solution to these shortcomings, termed elsewhere as bodystorming [11]. Briefly stated, the method is as follows: Before a bodystorming session, a preliminary observation and documentation is conducted. From the documents, interesting phenomena are selected and edited into easily readable design questions (see Fig. 2). A design question represents the phenomenon as a problem in the events, experiences, and/or practices of users. Participants go to a representative environment, e.g. if studying shopping malls, designers will go to a representative shopping mall. One design question at a time is given to participants. The attempt to solve the problem occurs in a place where the phenomena (or parts of them) are directly observable. This is in direct contrast to what we call here ‘traditional’ brainstorming, which is conducted in office environment unrepresentative of the studied environment. In some cases, to encourage further re-enactment, participants in a bodysession are not just passive observers but are asked to act out the activities. Generated ideas are recorded on-site and later discussed and elaborated in groups.

We argue that bodystorming can reduce the amount of time needed to study documents of user observations. People can more quickly and with less effort build a mental model of the surrounding, directly observable environment. In contrast, in traditional brainstorming, documentations of contextual factors, be they textual or pictorial, tend to be lengthy and take long to study. The key idea in bodystorming is that the descriptions of a problem domain (i.e. design questions) given to bodystorming participants can concentrate more on the description of aspects of the problem that are not observable, e.g. psychological (e.g. user needs), social (e.g. interpersonal relationships) or interactional (e.g. turn-taking in conversations). We also hypothesise that bodystorming can enhance the accuracy of conceptions of the problem domain. Many potentially important aspects that are omitted from documents of situated action may be directly observable in a bodystorming session and erroneous conceptions in documents may be rejected. Finally, we hypothesise that bodystorming enhances design ideas by permitting the evaluation of invented design ideas already on-site. Simulation and testing of generated ideas is easier and less error prone when the physical environment with its relevant constraints and affordances is directly observable. In traditional brainstorming, no feedback is available for this purpose. In addition, we believe that directly observable environment – in comparison to one based purely on documents – can free mental resources for decision making, problem solving, and reasoning needed in the design phase. Indeed, externalising representations, in comparison to keeping them in working memory, is known to reduce cognitive workload [12]. Moreover, contextual cues help retrieving relevant personal memories more effectively [13]. Contextual cues also facilitate recognising analogies in personal knowledge [14]. Moreover, contextual cues can facilitate directing attention to important features [15]. These properties of bodystorming, we believe, can make it suitable particularly for the design and innovation of ubiquitous computing applications.

1.3 Precursors of bodystorming

The idea of bodystorming is not novel, but its application to ubiquitous computing is. Apart from information technology products, designers have applied ‘hands-on’ approaches to the design of physical problems already in the 1960s. In the IT development, the method has emerged relatively recently. The term bodystorming was coined by Burns et al [11] while designing a computer workstation for a hairdresser who insisted that a computer “would not help her to run her business.” Burns et al created a small-scale project studio where the design team acted and improvised based on collected observational data. They used low-fidelity mock-ups to present design ideas in the course of innovation. They conclude: “By designing in an enactive way, we were able to build an increased empathy for the people that we had identified as the users we were designing for.” A year later, Burns et al [16] defined bodystorming as “reenacting everyday peoples’ performances and living with data in embodied ways by performance and improvisation.”

In their recent paper exploring a method they call experience prototyping, Buchenau and Suri [17] describe a bodystorming case where they investigated passenger needs for a new rail service by role-playing and improvisation during a real train journey – instead of using a