

# The Method of User's Requirement Analysis by Participation of the User: Constructing an Information System for Travelers

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**Abstract.** This study attempts to capture the problems discovered on a field trip and to clarify user requirements with the participation of the user. With Mobile AP II, a platform for gathering user information and communication, user and designer can discuss issues so that user requirements can be specified from the context of the situation. In addition, we use narrative factors based on user experience and activity to make modeling scenarios easy to organize. In this study, we discovered how helpful it is to share information and to communicate via Mobile AP II, and that scenarios could be built using narrative factors to analyze the context of information systematically.

**Keywords:** Scenario Based Design, User Requirement, Participatory Design.

## 1 Introduction

With the development of a universal environment for communications, information has become easily accessible. Furthermore, with an increase in the popularity of backpacking and day trips, the need while traveling has also changed significantly. Hence, when designing an information system or device for travelers, the kind of function provided, and the method by which such information is provided, are important in meeting the requirements of a traveler. When attempting to determine the actual requirements of a traveler, designers encounter differences in the traveler's background knowledge and in the cultural aspects of communication. At times, the requirements of the traveler are implied, and at other times, even the traveler himself does not really know what he wants. Hence, a method to draw out ambiguous and implicit requirements is needed, together with an appropriate way to provide such information to travelers.

Scenario is an available method to obtain a common understanding between designer and traveler. The person who requires the information and the person who provides the needed data may reach a shared understanding by interacting through framing a scenario [1]. In addition, scenario is a simple and effective method for

describing a situation, eliciting requirements, evaluating situations, and giving opportunity to understand intentions and culture [2]. Therefore, in order for travelers and designers to better understand each other during the design process, scenarios can be used to obtain a common design language.

## 2 Eliciting User Requirement

Eliciting user requirement is an important starting point while developing a new design. However, the difficult problem is how to gather the important user requirements during the primary design process. When we want to discover users' requirements, the most direct method is to ask the users. Nevertheless, sometimes the user's requirements are unknown or ambiguous and not easy to express in terms of an unknown situation. In addition, not all users are able to express themselves, or are limited by their lack of experience. In such cases it is difficult to inquire of the user directly, and it is difficult to determine a user's implicit requirements and introduce new design concepts that meet the user's requirements.

User-centered design usually focuses on exploring and satisfying the user's requirements. Therefore, it is an integral part to gather the user's requirements as part of the primary design process. User's requirements would discover from various clues of user offered. These clues are the evidence of people's activities, which are an implicit communication and an important component of the design [3]. These clues are useful information in requirement elicitation, and can help the designer to analyze needs as the potential, unidentified user's requirements gradually crystallize and become definite. In the design process, when problems are put forward, user requirements are discovered, and then we can think about satisfying user's requirements and solving problems.

To facilitate understanding, the factors determining a user's emotions, behavior, environment, etc. during their activities, it is essential to develop empathy with the user. To develop empathy requires a good communication tool. The power of narrative is the ability to communicate ideas [4]. Narrating a story is a way to harness the imagination, an intuitive and easy way to begin to understand the user's activities and to develop empathy between users and designers.

## 3 Narrating a Scenario by Story-Telling

A story is generally considered to be a user-centered design resource in which to keep record of events and experiences that are significant to the user. Such a story provides useful information on a user's thoughts about his experiences, which is helpful in the design process for the perspective it gives the designer.

Stories from the user's life can form scenarios that focus on the things that matter to the user, including specific activities, the environment, and interpersonal interactions. Story-telling is an easy way for user and designer to communicate, so that they have the same impressions in their mind as they narrate the plot of a story, making it possible to convey meanings, particularly emotional values and experiences.

Scenarios are stories that describe people and their process of activity [5]. However, creating a scenario requires not only knowing the usual where, when, and what, but also involves probing the why and the how-to. Scenario-based design method uses story-telling to describe events involving people, objects and circumstances relevant to user activities. It provides a good context to discover problems from the user's point of view and to improve designs incorporating new concepts.

A benefit of scenario is that allows designer making stories from user reported events, obtaining experiences from user's activities, and visualizing the situations. Namely, scenario can re-create situations as the user experienced them. The method of scenario is also useful because it can facilitate forming a common consensus among users and designers, and provide the benefits of collaborative thinking while exploring appropriate user requirements.

### 4 The Process of Creating Scenarios

Discovering problems has an opportunity to define user requirements, and usually arise from observing user activity. For this reason, eliciting requirements could be swift when based on user self-reporting, where the scenario approach describes the user's conditions, emotions, concerns, and activities. To explore these possibilities, we investigated user's activities, experiences, and constraints through Mobile AP II.

#### 4.1 Mobile AP II

Mobile AP II is a user self-report tool that can help a designer to understand a user's state of consciousness and activities (Figure 1). It provides support for obtaining user's life information and to documenting the particulars of the user's ongoing life, perhaps revealing whether he has improved in thinking and problem solving.

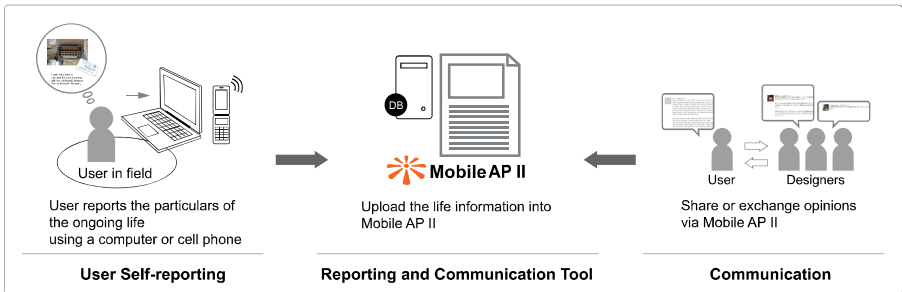


Fig. 1. Reporting and communicating via Mobile AP II

In this study, we used the Mobile AP II system to support the scenario modeling. Our aim was to use it as a tool to include user's perplexities in the design process. Using Mobile AP II is different from getting the user's information from interviews and quantitative data. The self-reporting of event by the user in the field means it will be possible to build a model of the user's own context. Self-reports are regarded as scenario-forming resources.

Mobile AP II is usable in different domains, not only gathering user reports on written scenarios, but also empowering both user and designer by putting them in communication via Mobile AP II so that they can further refine their concepts of problems.

## 4.2 Participation of the User

One objective of this method is to bring an extra dimension of realism to user-encountered problems and to encourage the participation of the user in analyzing problems that arise in certain situations, moreover, assist the designer to define user requirements. To achieve this, we involved Japanese students (as designers) and a traveler (as a user) from Taiwan, who used the Mobile AP II system to discuss the traveler proposed situation that the traveler was touring in Hakodate, Japan. Figure 2 illustrate the tasks of user and designers while using the Mobile AP II in design process.

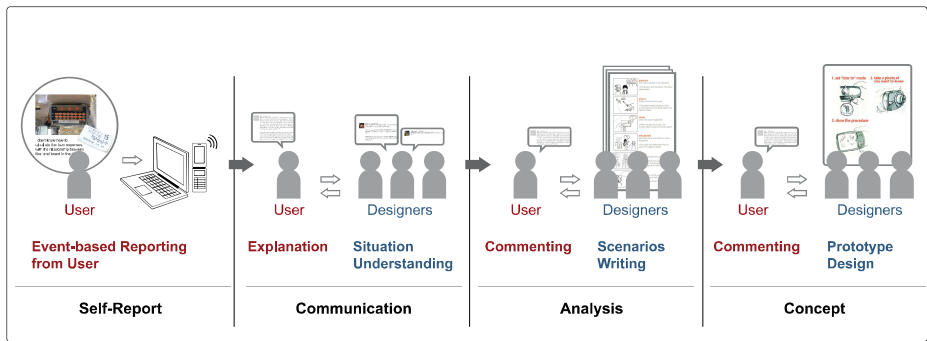


Fig. 2. The tasks of user and designers while using the Mobile AP II

The study used event-based reporting, requiring the user to provide reports of particular situation encountered. At every such event, the user could record a scene photo and a description of the situation to Mobile AP II, and discuss it with the designer using the comment function. The user and designer could jointly define the problems and requirements to determine the user's needs instead of just having the designers read a description of requirements.

## 4.3 The Steps of Scenarios Generation

The steps of scenarios generation are divided into the following steps (shown in Figure 3):

1. Capturing actual user experiences
2. Documenting the context of the User Story
3. Creating a Problem Scenario from User Story
4. Identifying the requirements of Requirement Scenario
5. Specifying the concepts of Solution Scenario

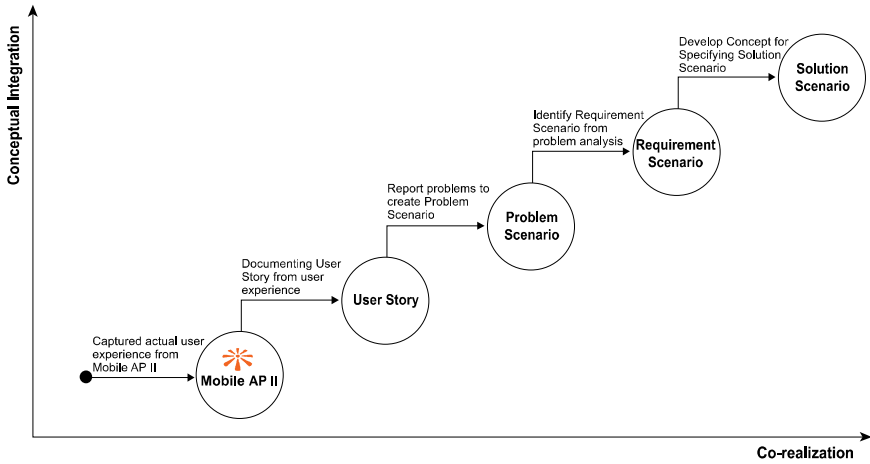


Fig. 3. Key steps of scenarios generation: the continuation of design strengthens the relationship between co-realization and conceptual integration

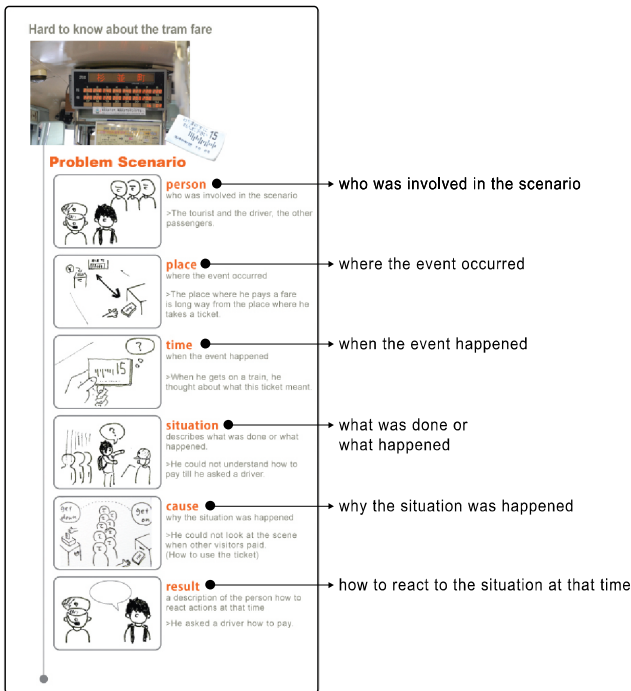


Fig. 4. An example of scenario which using narrative factors

The scenarios of this study include narrative factors: person, place, time, situation, cause and result (Figure 4). “Person” is who was involved in the scenario. “Place” is where the event occurred. “Time” is when the event happened. “Situation” describes

what was done or what happened. "Cause" is why the situation was happened. "Result" is a description of the person how to react to the situation at that time. Using these factors supports the analysis of a user's activity by modeling. With these narrative factors, writing a scenario could become a simple matter of reconstructing and representing user activities and thinking.

## 5 Discussion

In this study, analysis of user report and discussion with user enabled designer to discover requirements that reflected user's needs gradually. Initially, user was unable to specify requirements and summarize them neatly, e.g. "I want a simpler way to find out how to pay tram fare in a foreign country." However, with discussions between user and designers, and by analyzing the context that user's offered on their experiences, the designers could gather a view of user requirements that was more specific than what the user himself might propose. For example, the tram passengers might be spared having negative emotions when they are waiting the foreign traveler to pay the fare if the designer incorporates the "quickly" requirement when designing a fare information system for travelers.

In our use of Mobile AP II to realize user's actual situation, the designers could further analyze and discuss situations with the user to determine their requirements. In addition, we have found Mobile AP II to present the following advantages:

- It is possible to conduct a survey from any distance, potentially increasing one's understanding of people of a different culture.
- It allows asynchronous communication.
- A designer can act without the need to frame a hypothesis in advance, based on problems reported from the field by the user himself.

On the other hand, a negative factor is that the users may report without adhering to a schedule, causing time-consuming. Therefore, time distribution should be considered again.

## 6 Conclusions and Future Work

The Mobile AP II system encourages the sharing of experiences and open communication between user and designer, leading to a consensus on key issues. In addition, it makes it easy to create scenarios based on structural narrative factors and is a simple means of communication that can represent the context of situations systematically. Furthermore, it is helpful to analyze problems and determine requirements from context with user participation.

On the other hand, while this method is suitable for exploring the problems of a single situation, combining various situations as a basis for writing scenarios with Mobile AP II is difficult. Thus, what is now desired the most is a "scenario development system". This system would be based on the user's photos of scenarios with narrative factors, and would be able to link photos of various situations to integrate them and easily create new scenarios.

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