User Scenario Modeling using 5W1H & 5S in Home Environment

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Abstract: When designing an entirely new system, people with different specialties often have different opinions about the system-to-be. On one side, user's behavior is very abstract and flexible, UCD tells people to focus on user's need and behavior. On the other side, the system is very explicit and concrete. Engineering tells people to pay attention to structure, speed and reliability of the system based on existing technologies. However, a system can only be valuable when a user uses it, thus the communication between domains is crucial to the success of a system. Although methods and models have been proposed to facilitate the process, few of them can provide an equal view of the interaction between user and system. So in this paper, we discuss the use of 5W1H and 5 Human Senses in Scenario Modeling in home environment to make an accessible representation of the interaction between user and system.

Key words: Communication, Scenario Modeling, 5W1H, 5 human Senses, home environment.

1. Introduction and Background

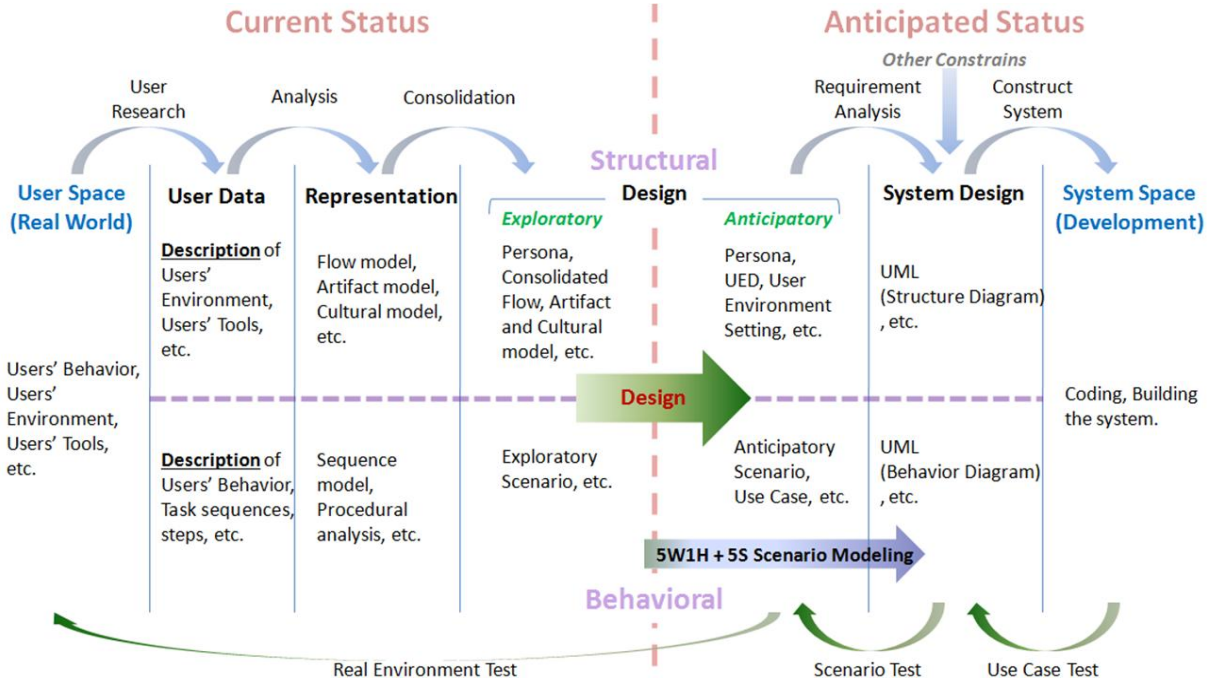

Figure 1-1: Design & Development Process and the position of our model

Since people with different expertise have different views about the system-to-be, development methods are created to support viable communications and cooperation between different experts. V-Model and Spiral Model

are successful approaches to ensure what the system does is exactly what user wants on many different levels. However, these methods are organizational methods to facilitate the process. There isn't an equal and objective model to represent the use of a system-to-be. This problem becomes even more serious when designing extremely complex system where many forms of interaction take place at the same time, such as ubiquitous computing in home environment.

Although scenario is helpful to illustrate the use of a system, itself can be constructed and modeled with different focus. In this paper, we propose the Scenario Modeling method using 5W1H and 5 human Senses, namely Who, What, Where, When, Why, How, and Sight, Hearing, Touch, Smell, Tastes. With the focus on the fundamental principles of Interaction between human and environment, our Scenario Modeling approach seeks the way of describing the basic interaction framework, eliciting essential details of use and being shared by people with different specialties.

2. Related Works

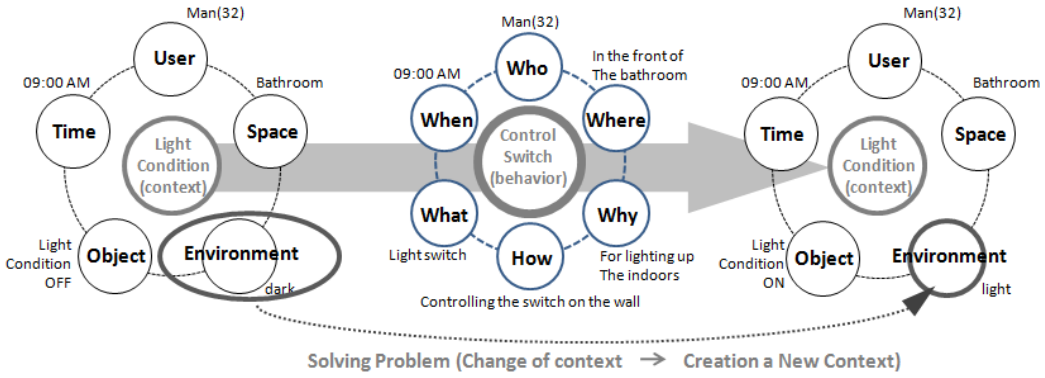

Figure 2-1: Tae Seung Ha and Ji Hong Jung's work of user behavior framework.

As stated in Tae Seung Ha and Ji Hong Jung's work, with the approach of ubiquitous computing environment, the interaction between systems and users in home-network environment should step up to the next level which is different from present method or using computer. Therefore, ubiquitous environment should be embodied for people and it must be started with understanding users and grasping sophisticated and fundamental needs of them. [1] In their research, 5W1H is proposed to describe the user behavior, and five context components are deduced from 5W1H to describe user's context, as shown in Figure 2-1. Although in their research there are detailed steps of gathering user's data, it's more like a step-by-step view without connections between user and context.

3. The Model using 5W1H and 5 human Senses

3.1 Basic Interaction Frame

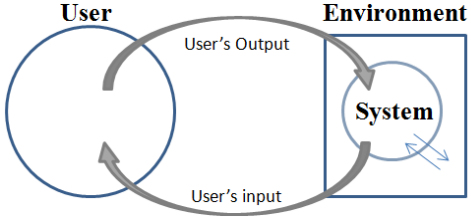

Figure 3-1: Interaction Frame from the view of isolating user

As asserted in Tae Seung Ha and Ji Hong Jung's work, "Ubiquitous" means installing the computer into the physical structure in the real world, in other words, until now we save information of each material in computer.

But in Ubiquitous environment, computer will be saved in materials, conversely. [1] When applying this concept to the Interaction Frame, it means the environment would also become a part of the system. Hence, a new point of view toward user, system and environment is needed for analyzing such coming situations. So we propose a new view of representing the Interaction Frame about user, system and environment, as shown in Figure 3-2.

3.2 Model with 5W1H & 5S

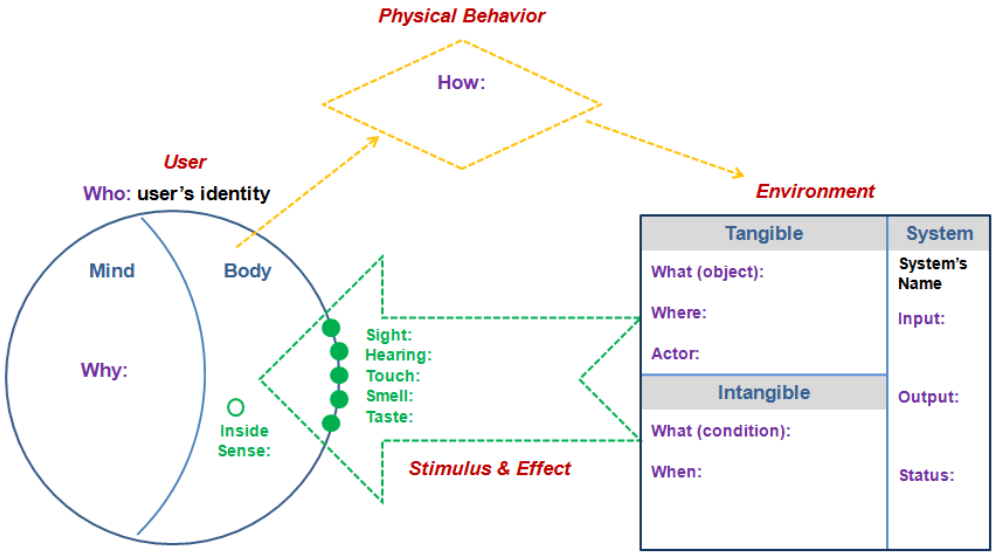

Figure 3-2: our proposed Model with 5W1H & 5S.

Based on the Interaction Frame shown in Figure 3-1, we propose our model using 5W1H and 5S to represent the interaction between user and environment, as shown in Figure 3-2. Basically the model has four parts. **Physical Behavior** and **Stimulus & Effect** are the interactions between **User** and **Environment**. The Environment is divided into three parts: **Tangible Environment**, **Intangible Environment** and **System** under consideration. 5W1H and 5S are used to describe the detailed information of the interaction and five human senses provide the way of articulating the user's input, instead descriptive sentences. The element **Actor** in Tangible Environment provides an objective as well as a system's point of view toward the user (similar to the actor used in UML). The element **What** is divided into two parts, **what object** which is tangible (chair, desk, cup, etc.) and **what condition** which is intangible (wind, temperature, etc.).

3.3 Model in practice

In real world, human's behavior is continuous, although mentally we can divide into steps, but the steps are very flexible and depend on focus. Granularity consideration in our model is crucial. So we adapt the hierarchical concept of Activity Theory to serve as this criterion, as shown in Figure 3-2.

In Activity Theory, an activity is the minimal meaningful context to understand individual actions. [2] Activities consist of actions or chains of actions, which in turn consist of operations. [2] Activities are oriented to motives, that is, the objects that are impelling by themselves. Each motive is an object, material or ideal, that satisfies a need; Actions are the processes functionally subordinated to activities, they are directed at specific conscious goals; Actions are realized through operations determined by the actual conditions of activity. [3]

In our approach, we change the term "Motive" and "Goal" into "Goal" and "Intention" respectively because of ambiguity. We define our model to be Action-Oriented, as shown in Figure 3-3. That is, we use our model to describe a single Action instead of Activity or Operation. Operations are described as a part of the model.

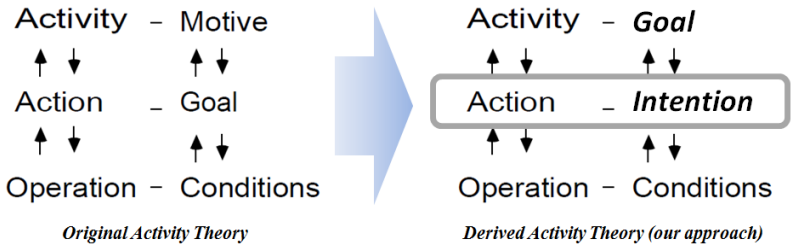

Figure 3-3: Hierarchical levels of an activity

We further develop the steps of applying approach in modeling scenarios: 1) Writing Scenario; 2) Activity Specification; 3) Filling Activity Table; 4) Filling Action Table; 5) Mapping to Model. Tables are designed to help distinguishing activities, actions and operations. And elements like 5W1H and 5 human senses mentioned in our model are used in these tables to capture essential information for our model.

5. Conclusion and Discussion

At this point, we proposed a scenario modeling method which can equally represent the interaction between user and system. With spaces for user and system side, we can illustrate the use of system-to-be more objectively, supporting communications between designers and engineers. However, there are some drawbacks of our approach. First, our model consists of large amount of data and information. It is a difficult work to manage these data. Thus a system is needed for mapping the data from the table to the model automatically, and provides methods to manipulate these data. Second, our approach is basically analytic and behavioral, which means it cannot give people a holistic view of the behavior and the structure of interaction. In the future, a case study of the using our model has to be conducted to check the usefulness of our approach. The case study should involve designers, engineers and other experts to discuss together based on our model. An operational definition should be created in order to evaluate the test result. Based on the test, we may further refine our model.

6. References

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