

Chapter 1 Introduction

Most designers nowadays use various design media during their design processes (Figure 1.1). The reason causing this is that each design medium is indispensable and provides specific stimuli to designers. The importance of each medium has already been described in former papers (Goel, 1995; Goldschmidt, 1991; Goldschmidt, 1999; Knoll, 1992). Switching among different media can give designers various stimuli and helps design thinking. However, designers have to transform the result from one medium into other forms while switching among media. This process is time-consuming and may interrupt design thinking. Research has combined features of different media by creating new design media; those researchers combine sketches and CAAD (Gross, 1996; Van Dijk, 1995), models and CAAD (Hiroaki, 1998; Piper, 2002; Anderson, 2000), or sketches and models (Igarashi, 1999; Jung, 2002).

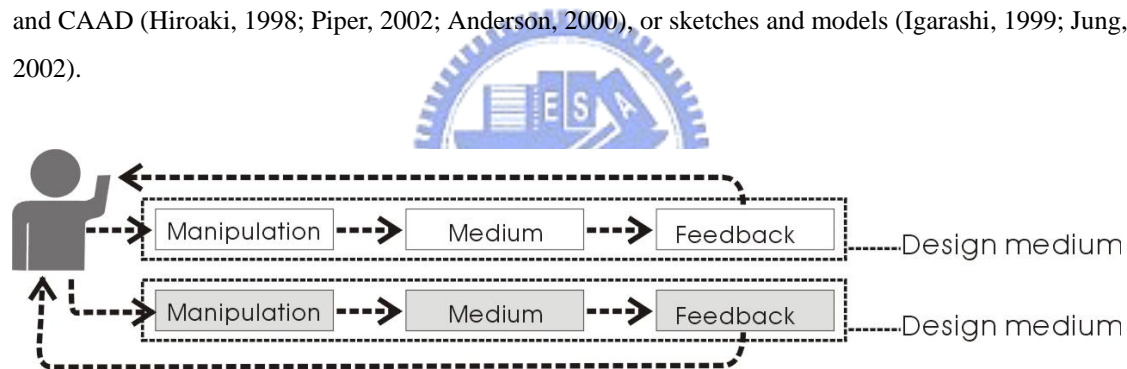


Figure 1.1: Generally, designers use various design media while each medium provides specific feedbacks.

As figure 1.2, the researchers integrate the manipulations and the forms of traditional media into new digital media. For example, in the Space Pen developed by Jung and Gross (2002), they adopt the way designers manipulate sketches and use it on models construction. This makes models construction more efficient. However, transforming traditional media into new forms may reduce the stimuli traditional media provide. For example, using sketches as the input for constructing models loses the ambiguity of the original sketches and the tangible senses provided by original models. Besides Jung and Gross, there are also many researchers trying to develop good new media that aids designers in different ways. However, as mentioned previously, these new media can not completely replace the original media. The same problem remains in the design process: designers have to switch among media while each medium helps designers separately.

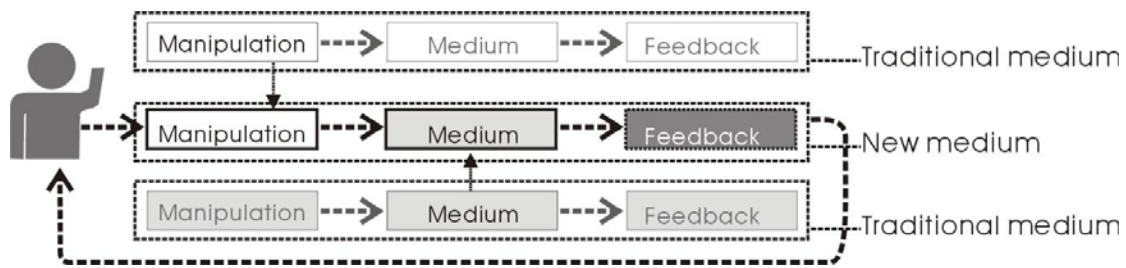


Figure 1.2: Some researchers transform the manipulations and forms of traditional media to create new media.

Considering most designers nowadays use both traditional and digital media. Moreover, new digital media are created and put into the design process with increasingly greater proportion. The relationships between different media become more and more important. Based on the idea that media should aid designers in collaboration but not separately, a system that can combine all traditional and new media is needed. As figure 1.3, the objective of this research is not to create a new medium but a platform that let various media act in collaboration. Since various design media share the results designers made while using each of them, designers will not need to transform the result they made from one form of medium to another.

The difficulty of combining feedbacks of different design media is that there are various forms of feedbacks. It is not possible to completely combine them together. However, all design media provides visual feedbacks. According to “seeing-moving-seeing” model (Schon and Wiggins, 1992), the visual feedback from design media has a great influence on design. Visual feedbacks always take an important part in architectural design. In other words, combining visual feedbacks of different design media is helpful for designers.

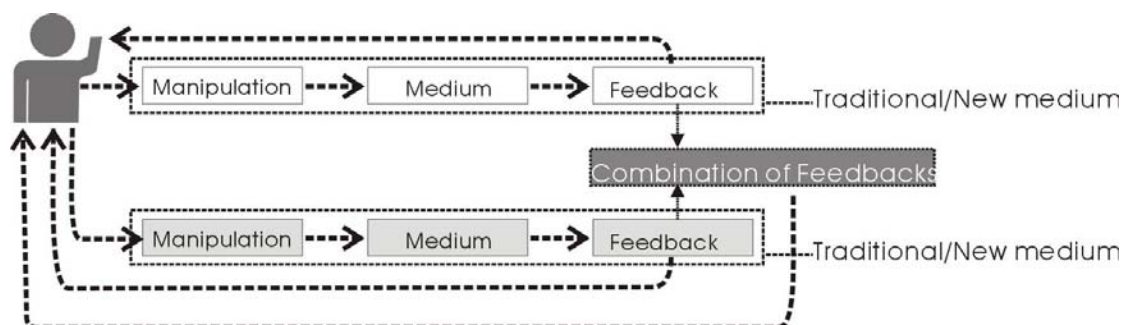


Figure 1.3: The objective of this research is not to create a new medium but a platform that let various design media act in collaboration.

The system built in this research helps designers to get visual feedbacks from various design media simultaneously during the conceptual stage of design by integrate the images of physical and digital media. Various ideas designers generate while using different media are combined together and stimulate designers at the same time. Meanwhile, ideas remain in the design process and provide additional assistance. As shown in figure 1.3, this research attempts to maintain original media and focus on combining feedbacks from them, which may give designers more stimuli in the conceptual stage of design.

The system created in this research uses augmented reality (AR) to combine physical and digital media and increase what designers see while using various media. This system also digitalizes the visual feedbacks provided by sketches and manually made models so that physical media can be integrated with each other. Also, the system is designed to be extendable to contain various digital media. In this research, a dynamic 3D virtual site model is developed and then added into the system to demonstrate the extensibility of the system. Designers can then use traditional media while seeing the site digitally at any angle, in any time, and on any date. This helps designers to rapidly evaluate the design visually. Designers can continue to use original design media that they are familiar with, and the features of the media are enhanced by the system. This not only makes design process more efficient but also improves the design since designers can get more visual feedbacks during design process.

The author gives a brief outline of the steps necessary to implement the system and complete such a research. First, a platform that is extendable to contain data and functions for various media is constructed. Second, sketches, manually made models and digital models are combined into the system. Also, a simple digital medium is developed and added into the system to demonstrate the extensibility of the system. Last, a demonstration of the system is made. Figure 1.4 illustrates the components of the system. In summary, the platform, main system database, GUI component, and output display are developed in the first step. As for hardware input devices and media data, this research doesn't create the hardware but only chooses from existing common used devices. The chosen of hardware input devices and media data and the implementation of media data storage, media data decode process and media data analyze are made in the second step. Also, media data storage, media data decode process and media data analyze are extended to add another digital media. Main system database and GUI component is modified in the second step to suit the needs for added media.

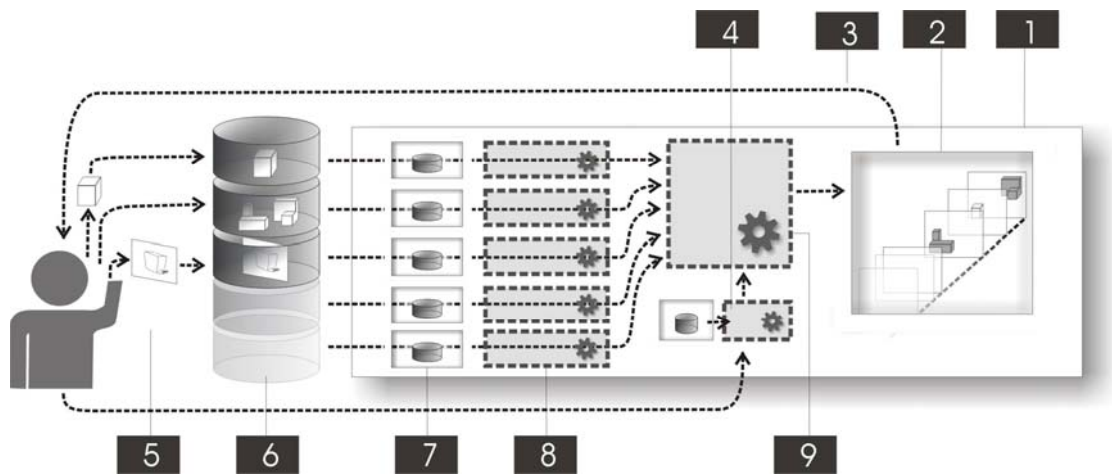


Figure 1.4: (1) the platform (2) main system database (3) output display (4) GUI component (5) hardware input device (6) media data (7) media data storage (8) media data decode process (9) media data analyze, synchronize, transform processes

