The Reflective Transformative Design Process

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Overview of your contribution

The department of Industrial Design at the Eindhoven University of Technology distinct itself through a unique combination of focus (designing highly intelligent systems, products, and related services) and education model (competency-centred learning). Based on the foundations of our department we identify three implications for our preferred design process: it is flexible and open, it values design action as a generator of knowledge and it is driven by a vision on the design opportunities that are afforded by emerging intelligent technology. In this paper we explain the reflective transformative design process and the rationale behind.

Keywords

Design process, competency-based learning, reflection on action, parallel design process, reflective transformative design process

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

The department Industrial Design at the Eindhoven University of Technology concentrates on the design of intelligent systems, products and related services. Moreover, we use a competency-centred learning approach to educate our students, or 'junior employees'

as we call them. Competency-centred learning gives equal weight to knowledge, skills and attitudes, and stimulates students to learn by doing. Within our department, a competency is defined as an individual's ability to select, acquire, and use the knowledge, skills, and attitudes that are required for effective behaviour in a specific professional, social, or learning context. So, it offers a holistic view of design.

We noticed that our foundations, i.e., designing intelligent systems, products and related services, and competency-centred learning, have implications for the design process we want to teach our students. In this paper we propose a design process that fits our foundations. Firstly we identify the implications of our foundations and subsequently present our reflective transformative design process [2].

Implication foundation ID on design process

When looking at the department's focus and the learning concept, we see three implications for the design process.

Transforming the world

Our contemporary culture has lost a unifying ideology [1]. This means that designers do not only have to develop the next generation of digital products with which we can pursue our lives, we also have to decide what kind of life and society we want these products to support. This asks in our opinion for a new type of innovations that can transform our society including the lives of people, and it asks for a new type of designers, being on the edge of design, engineering and science [2]. This also implies that the world of product design unite with that of HCI, which underlines the importance of design for the CHI community. These envisioned innovations cannot merely be technology-driven, or based on needs of users in existing product ecologies. Because new technology is potentially capable of transforming our world in ways that we cannot know of beforehand, we educate students to apply new technologies in new ways, driven by a design vision of how our (social) world could be, and based on solid user research. This requires a central place for creating a vision in the design process that we teach our students, and it requires support for exploring opportunities instead of solving problems. Let us exemplify our focus with a student project.



figure 1. Scope by Bas Groenendaal (coach: Richard Appleby)

Scope is designed by Bas Groenendaal [3] in his master graduation project. It is a photo camera that stimulates the psychosocial development of underprivileged children, especially children living in (former) warzones. Scope is held like a steering wheel and the frame is used to observe the surrounding world. Squeezing the two rings together makes a photo, which can be downloaded to a computer. Scope can be opened and placed on a surface for taking self-portraits. The shape and action possibilities of Scope change the process of photographing completely and it aims at and breathes different values than nowadays communication devices.

Person- and context dependent
Competency-based learning is a highly person- and context-dependent process. A different context asks for different competencies and different students will prefer different competencies and develop them differently. Therefore, our students create their own programme. The character of this education model as well as the notion that "the designer" does not exist, asks for diversity of design processes or flexibility within.

Integration knowledge, skills and attitude + reflection
Competency-based learning gives equal weight to knowledge, skills and attitudes, and stimulates students to learn by doing. It is about learning and performing through practical application, while simultaneously acquiring theoretical skills. Both aspects are bridged by reflection on action. This approach fits the profession of industrial design perfectly. Consequently, the design process(es) we offer the students should be holistic and give equal weight to knowledge, skills and attitudes throughout the process and stimulate reflection.

Reflective, transformative, design process

For developing designs like Scope, we propose a design process that supports the abovementioned principles namely 1) supporting transformation 2) supporting flexibility and individuality; 3) integrating knowledge, skills and attitudes; and 4) creating moments of reflection. For more detailed information why we do not use existing design methodologies like rational problem solving or reflective practice, we refer the reader to [4].

The model
Our design process exists of five activities that take place within the societal setting, but without a specific order. Dependent on the person, context, or phase within the design process, the student determines where he starts and the order of activities. This way the process supports flexibility and individuality. Moreover, every time he switches activities an opportunity for reflection occurs, therefore we stimulate frequent changes from one activity to another (lines Figure 2).

The central activity of the process is ideating, integrating and realising interaction solutions between users and products/the system in a context of use (central circle). In this continuing process the designer gains insight into the design opportunities. During the process these insights are physicalized and result into a final solution.

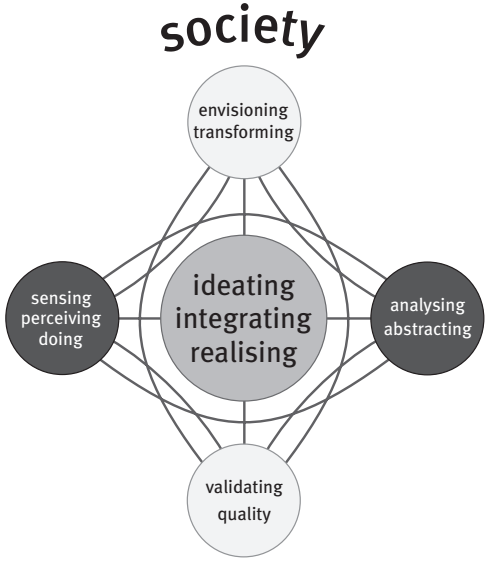


figure 2. The reflective, transformative design process

The development of these solutions is guided by a vision (top circle), in our case a vision about

transformation from our current reality to a new one through an intelligent system, product or related service. Because meaningfulness and value are person- and context-related issues, we believe that the solutions have to be developed and tested in society which requires experiencability of the solutions (bottom circle). The two remaining circles show the two types of skills the designer uses to develop solutions thus integrating knowledge and skills, i.e., the cognitive skills of the designer (right circle) as well as the perceptual-motor and emotional skills (left circle).

Information gathering

Developing design solutions in the centre of this model can be seen as a process of taking decisions based on too little information. The breadth of the solution domain and the interdependence of individual solutions, the design brief and vision makes it impossible to determine beforehand if a decision is the right one. Therefore, we consider design decisions conditional.

Drives (vertical axis)

We view the design process as a process where insight into the design opportunity and solution domain is achieved by continuous information gathering. Next to the design solution itself we see two drives for information gathering. The first drive is information gathering to direct the design decisions through a vision (top circle), the second drive is information gathering to validate design decisions (bottom circle).

Strategies (horizontal axis)

The drives are incorporated within two strategies that generate information and that reciprocally provide focus for each other. The first strategy revolves around design action (left circle). It produces experiential information that feeds into the connecting circles. The information that is spawned by design action takes the form of visualisations/ physicalisations that feed into the middle circle as integrations of a designer's knowledge, skills, and attitude. These visualisations/ physicalisations act as reference points for the other activities. The second strategy revolves around analysis (the right circle). It produces a more formal kind of information that (again) feeds into the connecting circles. Common sources for this formal information include literature and contextual inquiry.

Concluding

We regard the designerly skills instrumental in creating the future generation of subtle, nuanced and beautiful interactive product proposals. Yet, because we aim to design for the unknown we explicitly aim for an open model like the reflective transformative design process that gives students grip on the design process yet leaves room for innovation.

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