USABILITY OF SPECULATIVE DESIGN PRODUCTS

Svetla Ivanova-Vassileva
Technical University of Sofia, Machine Faculty, Department of Engineering Design, Sofia/Bulgaria, vassileva@fdiba.tu-sofia.bg

Abstract

The paper describes research on possibilities to apply the speculative design approach in the field of affective user interfaces. The focus is to investigate how users can feel relaxed, sure, happy and enjoy interacting with the systems and at the same time to achieve high performance. As in the typical iterative UX design process the first step is to prepare user and functionality analyses and after that to create protypes. These first stages are iterated until the validation of ideas is accomplished and interface design meets project constraints. Then the final draft is ready for development. Usability is relevant in every design stage. Users are involved as much as possible. The main goal of the study is to formulate design proposals for ergonomic, enjoyable and usable future products and systems.

Keywords - joy of use, usable speculative designs, UX design, user performance.

1 INTRODUCTION

Designing products and systems today is an intensive activity – short deadlines, innovative designs, perfect fit to user requirements etc. Various trials are made to find out which design speculations are probable and at the same time preferable in accordance with the PPPP Illustration by Dunne & Raby [Speculative Everything: Design, Fiction and Social Dreaming, (2013, p. 5)] ("Fig. 1"). These trials and experiments are precondition to achieve designers' goals and to create successful products.

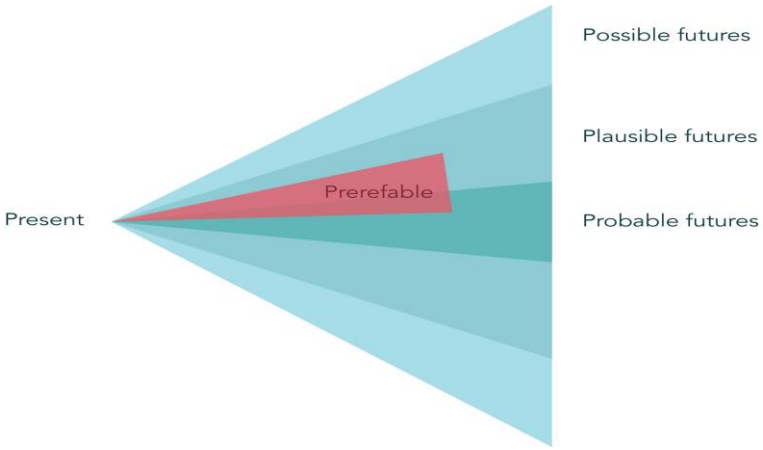

Fig. 1. PPPP Illustration by Dunne & Raby

The effort of experts in the field of Design and Technology, Ergonomics and Human Factors must be in direction analyses and prognoses of maximal overcome, preferable and probable futures and to extend the area of possibilities.

2 SPECULATIVE APPROACH AND AFFECTIVE PRODUCTS

While standards may guide and help us during the design process and support us when research is lacking, we need other tools and methods to help with idea generation if we want to create meaningful products for the future. [Sande (2019)]

The speculative design approach is a perfect mean not only to generate ideas for future products but also, to improve variable design alternatives. An example is the application of origami technic in design of products like lamps, hats, clothes, bags etc. in students works of the Engineering Design Department at the Technical University of Sofia [Ochkova-Dimitrova 2013].

2.1 Products and prototypes

Human-robot systems of HUBOT – The Job Agency for People and Robots ("Fig. 2a") relate to the research of human emotion and reactions about some future designs. The prototype of Shiva Therapist combines the unique therapeutic effect of human touch and the power of four additional robotic arms for the heavy work, allowing all day work and six-handed massages like an octopus, but with human sensitivity. Exoskeleton Mover is a motorized exoskeleton suit that gives muscular power via a system of electric motors to support humans' movements without straining the body [Next Nature Network 2019].

Both examples of products are chosen to illustrate two aspects: users' positive emotions interacting with the systems and high performance.

The next product is an affective user interface ("Fig. 2b"). It is a conceptual prototype of an application use case, where the phone is used as a source of affective data via two electrodes. The intent is to interpret the emotional state of users and adapt the behavior of an automated system to provide an appropriate response. That happens applying methods as UI prototyping and critical design [Godfrey 2019].

Fig. 2a. HUBOT 2017

Fig. 2b. Affective phone case

The paper is based on the idea to investigate how users can feel relaxed, sure, happy and enjoyed interacting with the systems and at the same time achieving high performance. The aim is to combine knowledge about Ergonomics and Usability Engineering with Affective and Speculative approaches to design products like speculative workstations as a part of the office or home.

2.2 Office workplaces

Innovative designs for the office, computer workplaces and design proposals are presented to describe the idea about including of affective elements.

A. Speculative ergonomic workplaces

Traditional ergonomic workplaces designed according to relevant requirements like anthropometric measurements, must be adjustable. Furthermore, combined office workplaces offering the possibility for sitting and standing are healthier. Other ergonomic workplaces' advantages are the option for a relaxed body position as in the Droian ergonomic computer workstation and "zero gravity" workstation.

Fig. 3a. Droian Ergonomic Computer Workstation

Fig. 3b. Hamster Wheel Standing Desk

Fig. 3c. Sit To Walkstation Treadmill Desk

Fig. 3d. Unity Bike Desk

Fig. 3e. Zero Gravity Workstation

Fig. 3f. Holographic interfaces in the office

In addition, there are sporting features - running, cycling etc. Sit stand Or Walk office chair workout machine, Unity bike desk or Hamster wheel standing desk ("Fig. 3a-e"). Futuristic computer workplaces include holographic interfaces in the office ("Fig. 3f").

If these speculative workplaces could be extended with affective features for example about user's ergonomic position, emotions and concentration level, that will affect people's attitude and performance in a positive way.

B. UX design: definition and process

ISO 9241-210 defines User Experience - UX [ISO2009] as "a person's perceptions and responses that result from the use or anticipated use of a product, system or service". UX refers to users' emotions, preferences, beliefs, perceptions, physical and psychological responses, behaviors and accomplishments that occur before, during and after use of a specific product or service. Relevant influence on UX quality has the context of use.

UX design process includes following steps:

1. Prepare user and functionality analyses
2. Create protypes
3. Iterate step 1 and 2 until the validation of ideas is accomplished.
4. Development

C. UX and Usability on every design stage

Usability is important in every design stage.

The three factors of usability *effectiveness*, *efficiency* and *satisfaction* and in addition with the factor *context* according BDS EN ISO 9241–11 [ISO 2018] are supplemented by the fifth factor *freedom from risk* in ISO/IEC 25010 [ISO 2011] about quality in use. A product quality model composed of eight software product quality characteristics (functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability and portability) could be useful in UX design of speculative computer workplaces with affective user interfaces. Products designed in a UX process are supposed to be valuable, useful, desirable, accessible, credible, findable and usable [Soegaard 2019].

In the table below are formulated questions for a sample questionnaire about user experience based on LOOK (credibility, trust, harmony, mood), FEEL (Joy of use – interaction, reaction) and USABILITY (functionality, intuitiveness, predictability).

Table 1. Sample UX based questionnaire based on GNU FDL (Author/Copyright holder: GNU FDL. Copyright terms and license: CC BY-SA 3.0)

LOOK	*FEEL*	*USABILITY*
Do you assess the system as credible and trustful?	Is the interaction with system enjoyable?	How do you rate system functions?
☹ 1 2 3 4 5 ☺	☹ 1 2 3 4 5 ☺	☹ 1 2 3 4 5 ☺
Is system's design harmonic?	Are you satisfied with system´s reactions?	To what extent is system intuitive?
☹ 1 2 3 4 5 ☺	☹ 1 2 3 4 5 ☺	☹ 1 2 3 4 5 ☺
Is user's mood influenced positively by system's design?	How do you assess total joy of use of the system?	Is system´s response clear?
☹ 1 2 3 4 5 ☺	☹ 1 2 3 4 5 ☺	☹ 1 2 3 4 5 ☺

Results of UX based questionnaires could be analyzed and be a basis to formulate design proposals for ergonomic, enjoyable and usable future products and systems. When prototypes of speculative and affective products are responding the ergonomic and usability requirements, users' experience and performance are higher.

3 CONCLUSIONS AND PERSPECTIVES

The implementation of effective features in the design of future products and workplaces for office and computer activities brings advantages in ergonomics and usability. Future research can include effective features designed alternatives, position, advantages, disadvantages etc.

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