The Conceptual Model of Experience Engineering (XE)

Masaaki Kurosu

The Open University of Japan
masaakikurosu@spa.nifty.com

Abstract. The conceptual model of XE (experience Engineering) was proposed to cover both of the products and services. It was also proposed to take "U" out from "UX" so that more adequate description of the people can be possible.

Keywords: experience engineering, XE, usability, UX, service, marketing.

1 Introduction

The term UX (User Experience) was first proposed by Norman as the concept that "*deals with all aspects of the user's interactions with the product: how it is perceived, learned, and used. It includes ease of use and, most important of all, the needs that the product fulfills.* (Norman, 1998, p.47)". He first used the term in 1993 at the meeting in Apple and he changed his job title from "User Interface Architect" to "User Experience Architect" (Wirtanen, 2012). Later, he wrote that "*I invented the term because I thought human interface and usability were too narrow. I wanted to cover all aspects of the person's experience with the system including industrial design, graphics, the interface, the physical interaction, and the manual*." (Norman, 1998).

But he also wrote that "*Since then the term has spread widely, so much so that it is starting to lose its meaning*" and complained as "*User experience, human centered design, usability; all those things, even affordances. They just sort of entered the vocabulary and no longer have any special meaning. People use them often without having any idea why, what the word means, its origin, history, or what it's about.* (Merholz and Norman, 2007, p.1)"

Indeed, there are so many definitions to the term of the UX as are listed in http://www.allaboutux.org/. It was 2010 when the ISO standard adopted the term and gave the definition as "*the person's perceptions and responses resulting from the use and/or anticipated use of a product, system or service*" (ISO9241-210:2011, p.3). Unfortunately, this definition has not yet become popular, perhaps because this standard was too late to appear and neglected many of the past discussion on the concept (Law, et al. 2006, 2007, 2008, Kindsmuller and Mahite 2007, Loujus 2010) and the UX White Paper (Roto et al. 2011).

Besides, ISO9241-210 added the "service" to the system and the product as the target of HCD (Human-Centered Design) without careful deliberation on differences in terms of the design process, sub-concepts, etc.

This paper proposes a conceptual model for the HCD that can be applied to the service as well as the product and the system from the viewpoint of the experience (X).

M. Kurosu (Ed.): Human-Computer Interaction, Part I, HCII 2013, LNCS 8004, pp. 95–102, 2013.

2 HCD Process Model in ISO9241-210

ISO9241-210 proposed a process model for the HCD as shown in Fig. 1. The model is fundamentally the same with the one proposed in its previous version ISO13407:1999.

The process starts from "Plan the Human-Centered Activities", then proceed to "Understand and Specify the Context of Use", "Specify the User Requirements", "Produce Design Solutions" and "Evaluate". From "Evaluate" there are three feedback loops to previous three activities to form the iterative loops. And if the result of the "Evaluate" is acceptable, the process goes to "Design Solution Satisfies Requirements" to finalize the design process.

Although there are three iterative loops described in the figure and the whole design process seems to be iterative, it is seldom that the process goes back to "Understand and Specify the Context of Use" and "Specify the User Requirements". What frequently occurs and makes the process as a human-centered is the iteration between the "Evaluate" and "Produce Design Solutions". Then the whole cyclic process model will become a kind of the waterfall that has a local iteration.

Anyways, activities in the whole process especially "Understand and Specify the Context of Use" and "Evaluate" are human-centered because much user involvement is required for those stages. At this point, it is acceptable that the concept of HCD can be applied to the service as well as the product and the system.

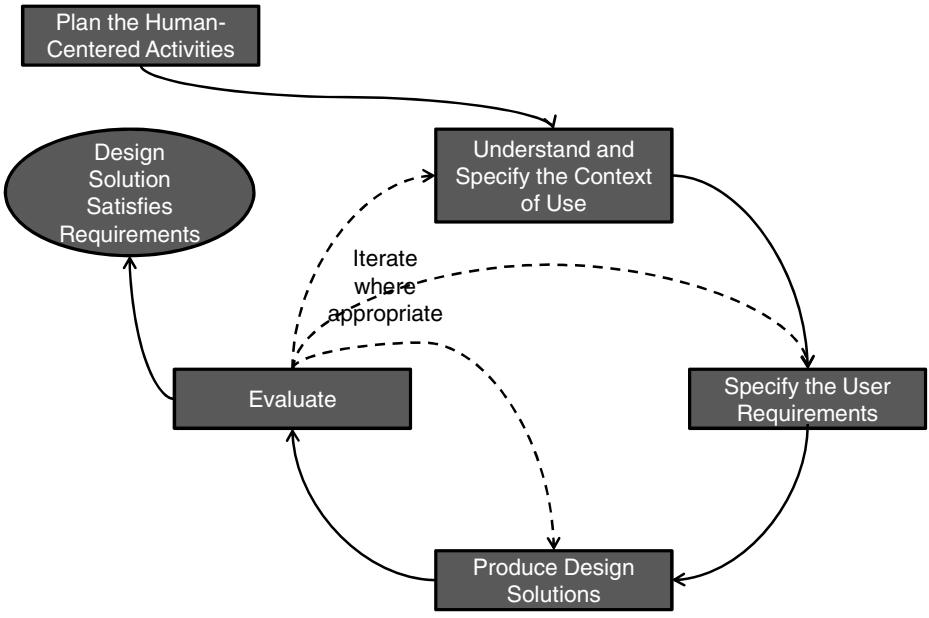

Fig. 1. The HCD Process Model in ISO9241-210 (1999)

3 UX Process Model in the UX White Paper

While the process model of ISO9241-210 was drawn from the viewpoint of the manufacturer, the UX process model in the UX White Paper was drawn from that of the user as in Fig. 2

The model starts "Before usage" where "Anticipated UX" is formed by "imagining the experience". Next is "During usage" where "Momentary UX" is formed by "experiencing". Then "After usage", "Episodic UX" is formed by "reflecting on an experience". Finally "Over time", "Cumulative UX" is formed by "recollecting multiple periods of use".

This model basically corresponds to the definition of UX in ISO9241-210 that referred to "*the use and/or anticipated use"* but is more thoughtful for referring to the experience afterwards.

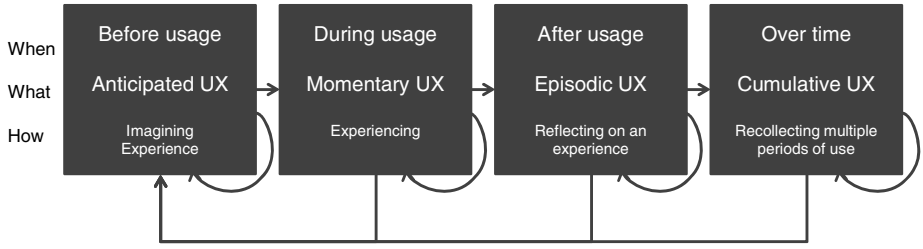

Fig. 2. The Process Model of UX in the UX White Paper (2011)

4 UX and Service

In ISO9241-210, the HCD claims to be relevant to the service in addition to the product and the system. The service is also referred in the UX White Paper as "'*System' is used to denote products, services, and artifacts – separately or combined in one form or another – that a person can interact with through a user interface* (p.6)". But the question arises whether the word "use" or "user" can be adequate for the service.

Clark (1940) was the first to differentiate the industry into three categories as "*Primary industries are defined as agriculture, forestry and fishing; secondary industries as manufacturing, mining and building; the tertiary industries include commerce, transport, services and other economic activities* (p.7)" He further wrote as "*Economics is defined as the study of the production, distribution and exchange of all those goods and services which are usually exchangeable, or are actually exchanged, for money* (p.1)".

In his idea, that "goods" and "services" are two different output of the industry, i.e. the former is the output of the secondary industries that include manufacturing and the latter the output of the tertiary industries that include the service. And, of course, "goods" are to be used. But how about the "services"? Is it simply "to use"? Are we 'using' doctors and nurses at hospitals to be cured? Are we 'using' teachers at schools to learn something? It's possible, but is not completely adequate. "Customer" is more

appropriate in the situation of the service than the "user" and "to receive" or "to have" will be more appropriate than "to use" (though this issue is largely dependent on the language).

In this sense, the term "UX" is not adequate for the service and the better solution is just to use X (experience) in its broader sense. Fig. 1 was initially used for describing the process of the UE (usability engineering) in ISO13407. But when the standard was revised to be ISO9241-210 and the target of the standard was reconsidered to include the service, it should be called as the process of UXE (UX engineering), though nobody has ever called it as such. Because UXE is not adequate for the service, I would propose the name "XE" (experience engineering) for covering both of the goods and the services.

5 Service Quality Model

Regarding the service, Parasuraman et al. (1985) proposed a conceptual model of service quality as shown in Fig. 3. In this figure, both the consumer and the marketer are described where the flow of consumer is going down to meet the dashed line and the flow of marketer is coming up to it. The customer forms the expected service based on the word-of-mouth communications, personal needs and past experience. On the other hand, the marketer provide the service based on the management perceptions

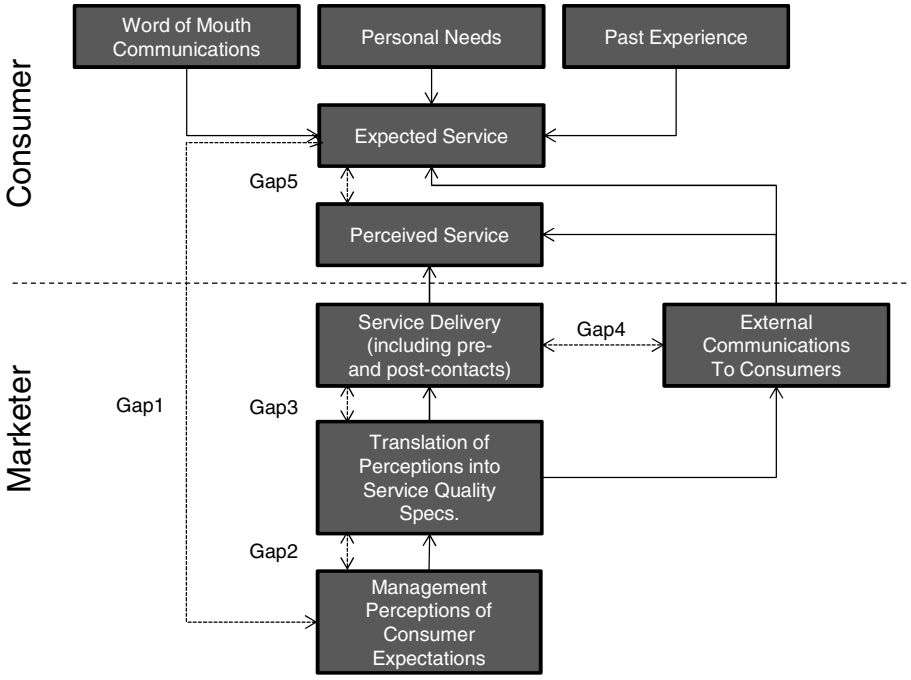

Fig. 3. Conceptual Model of Service Quality by Parasuraman et al. (1985)

of consumer expectations, then the translation of perceptions into service quality specifications will use the external communications to consumers. Finally, the marketer delivers the service including pre-/post-contacts. Finally, the matching will occur between the expected service and the perceived service, and the service quality will be perceived.

Fig. 1 was described from the viewpoint of the manufacturer and Fig. 2 was described from that of the user, but this figure includes both of the consumer and the marketer.

6 Proposed Model of XE

The author (2011, 2012) once proposed a model of UX and here will present a revised model for both of the goods and the services including the process on the side of the industry and the market as Fig. 4 and 5.

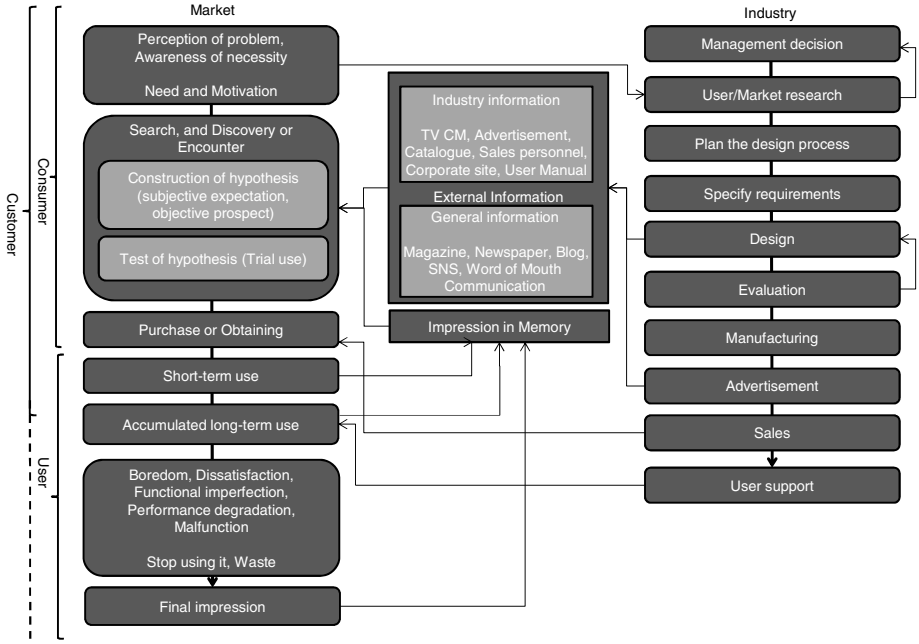

Fig. 4. Model of XE for goods

In either model, the market is drawn on the left and the industry on the right and the information relevant to the market (people) is positioned in between and the time course is drawn downwards.

The market side process will be triggered by the perception of problem or the awareness of necessity. Then the need and the motivation will arise. People start to search and discover/encounter some artifact and will construct the hypothesis

including the subjective expectation and the objective prospect. If they may have a chance, they will test the hypothesis by the trial use. If the hypothesis is positive, people will purchase or obtain that artifact and start using it. After the short-term use, they usually continue to use it and the impression of long-term use will be accumulated in memory. But boredom, dissatisfaction, functional imperfection, performance degradation, and malfunction will let them cease to use it or waste it. Although the artifact is gone out of sight, the final impression will reside in memory.

The industry side process will be triggered by the decision of the manager, then the user/market research will be conducted. Based on the information obtained from the research, the design process will be planned and the design process as is depicted in ISO9241-210 will start including the specification of requirements, design and the evaluation. When the design is completed, the manufacturing will start and the advertisement will give the information to the market. The sales activity follows and the user support will be conducted for the user. In this process, there is one iteration between the user/market research and the management decision, and there is another iteration between the evaluation and the re-design.

The information includes the external information and the (internal) impression in the memory of people. The external information consists of the information coming from the industry and the information provided by general sources. The industry information comes partly from the design section and partly from the advertisement section and will affect the search and discovery activity for the adequate artifact in the market.

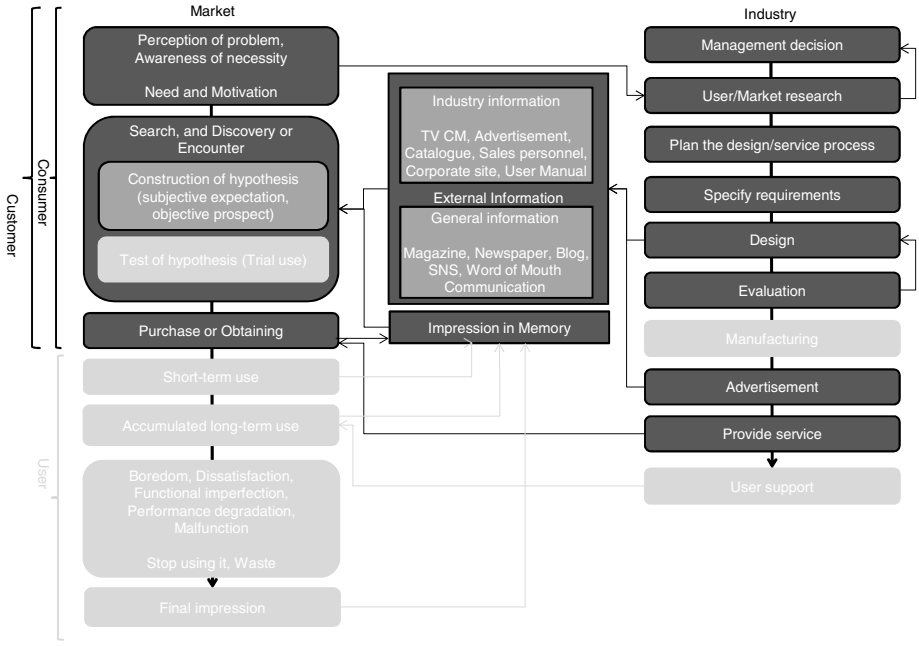

Fig. 5. Model of XE for services

Fig. 5 is fundamentally the same with Fig. 4 except irrelevant stages are greyed out. As shown in the figure, the user process are all greyed out because of the inseparability of production and consumption and the perishability of the service as was described as two of the major characteristics of service by Zeithaml et al. (1985). Other two characteristics of service also proposed by them, the intangibility and the heterogeneity, are not described in this figure.

7 Conclusion: XE as an Engineering

In this paper, the conceptual model of XE was proposed to cover both of the products and services. It was also proposed to take "U" out from "UX" so that more adequate description of the people can be possible.

For the XE to be legitimately in the engineering domain, it is still necessary to propose a new list of determinants of service quality similar to what Parasuraman et al. proposed in terms of the service and ISO9241-11 did in terms of the usability. Besides, adequate methods should be categorized (or developed) regarding the whole lifecycle process of the products and the services.

But, anyways, this is an initial proposal for the XE as a new domain of engineering.

References

Clark, C.: The Conditions of Economic Progress. Macmillan and Co. (1940)

ISO/IEC 13407:1999. Human-Centred Design Processes for Interactive Systems (1999)

ISO 9241-11:1998. Ergonomic Requirements for Office Work with Visual Display Terminals (VDTs) – Part 11: Guidance on Usability (1998)

ISO 9241-210:2010. Ergonomics of Human-System Interaction - Human-Centred Design for Interactive Systems (2010)

Kindsmuller, M.C., Mahlke, S.: MMI-Interaktiv Nr. 13 (2007), http://useworld.net/mmijij/ue

Kurosu, M.: UX in HCD. Seminar of HCD-Net (2011) (in Japanese)

Kurosu, M.: Describing Experiences in Different Mode of Behavior – GOB, POB, and SOB. In: KEER 2012 Conference (2012)

Law, E.L.-C., Bevan, N., Christou, G., Springett, M., Larusdottir, M. (eds.): Proceedings of the International Workshop on Meaningful Measures: Valid Useful User Experience Measurement (VUUM). COST (2008)

Law, E.L.-C., Hvannberg, E.T., Hassenzahl, M.: User eXperience – Towards a Unified View. In: The 2nd COST294-MAUSE International Open Workshop at NordiCHI 2006 (2006)

Law, E.L.-C., Vermeeren, A., Hassenzahl, M., Blythe, M. (eds.): Towards a UX Manifesto – COST294-MAUSE Affiliated Workshop. COST (2007), http://www.cost.esf.org/

Luojus, S.: From a Momentary Experience to a Lasting One. University of Oulu (2010)

Merholz, P., Norman, D.A.: Peter in Conversation with Don Norman About UX & Innovation (2007), http://www.adaptivepath.com/ideas/e000862

Norman, D.A.: The Invisible Computer – Why Good Products Can Fail, the Personal Computer is So Complex, and Information Appliances are the Solution. The MIT Press (1998)

Parasuraman, A., Zeithaml, V.A., Berry, L.L.: A Conceptual Model of Service Quality and Its Implications for Future Research. J. of Marketing 49, 41–50 (1985)

Roto, V., Law, E.L.-C., Vermeeren, A., Hoonhout, J. (eds.): User Experience White Paper – Bringing Clarity to the Concept of User Experience (2011), http://www.allaboutux.org/uxwhitepaper/

Wirtanen, A.: When did UX start being called UX (2012), http://ux.stackexchange.com/questions/27810/when-did-ux-start-being-called-ux

Zeithaml, V.A., Parasuraman, A., Berry, L.L.: Problems and Strategies in Services Marketing. Journal of Marketing 49, 33–46 (1985)