Revisiting "User Experience Over Time": Towards Methods and Metrics for Temporal UX Phases in the Age of AI

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Abstract

Long-term user experience and its evaluation have a long history in research. However, it still poses open challenges to the research community, especially due to evolving interactions between users and systems. This paper revisits Karapanos et al.'s seminal framework on the temporality of user experience to highlight the growing need for methods and metrics that capture long-term user experience in real-world use. We discuss its ongoing relevance and outline challenges and directions for extending their framework with standardized longitudinal metrics that also meet the needs of adaptive, AI-driven systems.

CCS Concepts

• **Human-centered computing** → **Human computer interaction (HCI)**; **Empirical studies in HCI**; *HCI theory, concepts and models.*

Keywords

Revisting HCI research, user experience evaluation, long-term user experience, temporality of experience

1 Introduction

User experience (UX) evaluation, including its relevant aspects and appropriate methods, is a topic that is continuously discussed in the HCI community [10]. While there is a substantial amount of work in this area, the majority of contributions are at a conceptual level, limited to identifying the relevant UX concepts to be measured. What falls short is the development of appropriate methods and metrics to assess UX with high validity [10], especially considering the temporal aspects involved and the need to evaluate experience in real-world usage [7].

To highlight the importance of the temporal aspects of UX and to stimulate work towards methods and metrics assessing them, this extended abstract revisits the seminal work of Karapanos et al. [3] from 2009 (https://dl.acm.org/doi/abs/10.1145/1518701.1518814). In their paper, they present an ethnographic field study over a period of five weeks, revealing differences between initial and prolonged experiences. Further, they propose a conceptual model for "the temporality of experiences" covering the four phases "anticipation" (expectations prior to experience), "orientation" (initial experiences driven by excitement and learning), "incorporation" (reflecting on how the system is useful in daily life), and "identification" (system is part of our daily life and routine). These phases are driven by forces such as familiarity with, the functional dependency on, and the emotional attachment to the system. In the following sections, we revisit their work and outline potential extensions.

2 Towards Metrics for Long-Term User Experience

While the original study focused on the iPhone in 2009, its insights into how UX develops and transforms over time have gained even more importance today, where a vast amount of AI-based assistants and tools as well as subscription-based platforms and services push into the market and are rapidly replaced if not designed for sustained adoption and meaningful use. In addition, the work's reflections on the divergence between expectation and actual experience resonate strongly with the modern landscape of hype cycles surrounding emerging technologies such as artificial intelligence, which leads to evolving user expectations being a central challenge. This makes the design directions proposed by Karapanos et al., namely focusing on meaningful mediation, daily rituals, and self-identity, more relevant than ever.

While the majority of HCI studies focus on single-session studies, it is well known in the research community that more longitudinal studies considering real contexts of use are needed to improve the validity of results [7]. Besides lower costs and reduced effort likely contributing to more single-session studies, the lack of frameworks and metrics for efficient assessment of long-term UX in real settings might be an additional hurdle for long-term studies. In this context, the work by Karapanos et al. [3] can be regarded as an early role model, leveraging an extensive ethnographic field study. Further, future work should build upon the conceptualization they proposed and develop standardized quantitative metrics that are tailored towards the identified phases to measure the relevant aspects of UX in each of them.

3 User Experience Evaluation in the Age of Artificial Intelligence

In the current age of artificial intelligence (AI), there is also potential for further development of the work by Karapanos et al. [3]. In particular, the potential impact of the following two aspects should be discussed and examined.

The first aspect is the increasing intelligence of systems. Traditional evaluation methods were originally developed for deterministic and GUI-based systems [2]. Accordingly, these methods

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fail to capture the probabilistic and adaptive nature of modern AI-driven systems with complex behaviors such as personalization [12], proactivity [6], and context-awareness [13]. Ntoa et al. [10] argue that UX evaluation becomes more complex as intelligent systems require a vast amount of parameters to be captured. Overall, these papers suggest that the behavior and usage of systems are changing, which necessitates adapting evaluation methods as well [9]. For instance, the adaptivity of systems may alter transitions between the temporal phases of UX. In this context, we raise the following two questions: *"Does the shift towards more proactivity in intelligent systems introduce new relevant facets to UX evaluation?"* and *"How can the adaptive nature of intelligent systems be properly captured in UX evaluation?"*.

The second aspect is the increasing amount of recent work highlighting potential negative consequences of interaction with AI systems, such as over-reliance (e.g., [11]) and downscaled cognitive activity when working with AI support [5]. This raises the question of whether the current focus on UX and its evaluation based on user joy and aesthetics [1] is still sufficient. Especially as such negative impacts may accumulate over time, temporal and more holistic evaluations gain even more importance. The concept of human flourishing [8, 14] should be considered to derive metrics that ensure interactions not only cause excitement in the short term, but also optimize desired human outcomes in the long term. In addition, future work could leverage conceptualizations of human relationships from communication science (e.g., the relationship stages by Knapp and Vangelisti [4]) to identify factors and patterns relevant to positive interaction with adaptive AI systems.

Overall, this paper argues that a renewed focus on the temporality of UX is essential as interactive systems become increasingly intelligent, adaptive, and influential in daily life. Revisiting Karapanos et al.'s study and framework offers a valuable foundation for developing longitudinal methods and efficient metrics that capture the core components of UX across different phases of product adoption while also accounting for the adaptivity, proactivity, and potential well-being impacts of modern AI systems.

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