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Inter-Platform Consistency Inspection Method

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ABSTRACT

Inter-platform consistency is a central inter-usability attribute in cross-platform service design. However, limited studies have investigated the importance of the different characteristics of inter-platform consistency for user experience (UX) of cross-platform services. A discounted, easy, fast inter-platform inspection method for cross-platform service design is still unavailable. In this paper, the authors present the results of a study on inter-platform service consistency using a new inspection method. Three UX experts evaluated three cross-platform services using predefined inter-platform consistency heuristics (perceptual, lexical, operational, and compositional). The evaluation yielded 287 inter-platform consistency findings (194 negative and 93 positive). The results indicated that all predefined consistency heuristics that represent inter-platform consistency characteristics are important and should be considered when designing the UX of cross-platform services. The evaluators assessed our inspection method and found it appropriate and effective.

KEYWORDS

Consistency, Cross-Platform, Inspection Method, Inter-Platform, Inter-Usability, User Experience

INTRODUCTION

Over the past three decades, a significant shift has occurred in how we interact with computers. We now have access to an unprecedented range of powerful computing devices with varying features, functions, and technical capabilities, which was not the case in the entire history of computing (Oulasvirta, 2008). As computing devices have become more widespread, users now engage with products and services on a broader range of computing platforms (hardware and software). As a result, the use of cross-platform services is expanding, and the demand for "always-on services" has been growing rapidly (Forrester Research, 2013; Lascau, Wong, Brumby, & Cox, 2019; Microsoft, 2013; Monge Roffarello & De Russis, 2021).

In the context of the proliferation of computing devices and their rapid adoption by people, many terms emerged to describe interactive systems accessible through multiple platforms. The term 'cross-platform service' is used to describe "a set of user interfaces (UIs) for a single service encompassing two or more computational platforms for interacting with the service" (Majrashi, 2016; Majrashi, Hamilton, & Uitdenbogerd, 2015). The term 'multiple user interfaces' (MUIs) is also used to describe views of the same information and services accessed by users from different platforms (Nilsson, 2006;

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Samaan & Tarpin-Bernard, 2004; Seffah & Javahery, 2005). Other terms are also used to describe cross-platform interactive systems, including 'cross-platform user interfaces' (Majrashi, Hamilton, & Uitdenbogerd, 2018; Richter, 2007), 'multiple platform user interface' (Ali, Perez-Quinones, Abrams, & Shell, 2002; Meskens, Vermeulen, Luyten, & Coninx, 2008), 'distributed user interface' (DUI) (Bång, Larsson, Berglund, & Eriksson, 2005; Gallud et al., 2011), 'cross-device user interface' (Lin & Landay, 2008; Nebeling, Mintsi, Husmann, & Norrie, 2014), 'multi-channeling' and 'cross media' (Segerståhl, 2008).

Several terms are used to describe interactions with cross-platform interactive systems, including 'cross-platform interaction' (Majrashi, Hamilton, & Uitdenbogerd, 2017), 'cross-device interaction' (Hamilton & Wigdor, 2014; Santosa & Wigdor, 2013), and 'multi-device interaction' (Raptis, Kjeldskov, & Skov, 2016; Santosa & Wigdor, 2013).

Cross-platform services allow users to perform tasks using multiple devices, such as desktop computers, smartphones, laptops, and tablets. Users currently perform different activities across devices, such as searching for information, managing finance, social networking, planning a trip, shopping online, and watching a video (Google, 2012; Jokela, Ojala, & Olsson, 2015; Microsoft, 2013).

In response to the spread of cross-platform services, multi-device adoptions, and cross-platform interactions, new research themes have emerged in the field of human-computer interaction (HCI), such as inter-usability and cross-platform or cross-device user experience (UX) (Zhang et al., 2021). Inter-usability concerns the ease of use of interactive systems when switching between them across devices (Denis & Karsenty, 2004), and cross-platform UX refers to an individual's perceptions resulting from interaction with the systems across devices (Majrashi, 2016). According to Wäljas, Segerståhl, Väänänen-Vainio-Mattila, and Oinas-Kukkonen (2010), the primary aim of the cross-platform design is to ensure that the user experience is coherent. Shin (2016) further highlighted that this emphasizes the importance of inter-usability as a crucial factor in the development and success of cross-platform services.

Inter-platform consistency, also known as cross-device consistency and inter-device consistency, has been identified as a central inter-usability element (Denis & Karsenty, 2004; Majrashi, 2016; Majrashi, Hamilton, & Uitdenbogerd, 2016a, 2016b; Majrashi et al., 2017; Rodrıguez, 2019; Sánchez-Adame, Mendoza, Meneses Viveros, & Rodríguez, 2019). Inter-platform consistency concerns how the UI designs and contents of the same system are consistent across platforms or the consistency of the user experience across multiple platforms (Burny & Vanderdonckt, 2022; Gajos, Wu, & Weld, 2005; Guerra-Manzanares & Välbe, 2022; S. Kang & Kim, 2007; Paternò & Santoro, 2012).

Prior studies recommend maintaining inter-platform consistency through several interface components across platforms (Denis & Karsenty, 2004; Majrashi, 2016). However, it has been argued that although inter-platform consistency is an important inter-usability attribute, interface components across platforms cannot and should not be entirely consistent at all levels (Wäljas et al., 2010). Nevertheless, there is a lack of studies on the impact of inter-platform consistency on cross-platform UX to determine which aspects are essential for enhancing the UX of cross-platform services. Therefore, one aim of this study is to address this research gap.

As an emergent interaction mode, cross-platform interaction requires new or customized evaluation methods and metrics to support cross-platform design (Antila & Lui, 2011; Majrashi, 2016). As an example, the need for new methods has been taken into account by Majrashi, Hamilton, Uitdenbogerd, and Al-Megren (2020), who built an assessment model for testing cross-platform usability (inter-usability), and Väänänen-Vainio-Mattila and Wäljas (2009), who developed an expert evaluation method for the UX of cross-platform web services. Consistency inspection is among the main usability inspection methods in the traditional usability engineering life cycle (Nielsen, 1994b). Heuristic evaluation is considered a discount usability engineering method. Studies have found that it is an efficient method for finding usability issues in user interfaces (Jeffries, Miller, Wharton, & Uyeda, 1991; Mack & Nielsen, 1994). However, a consistency inspection method for the inter-usability,

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