

Conferencia:

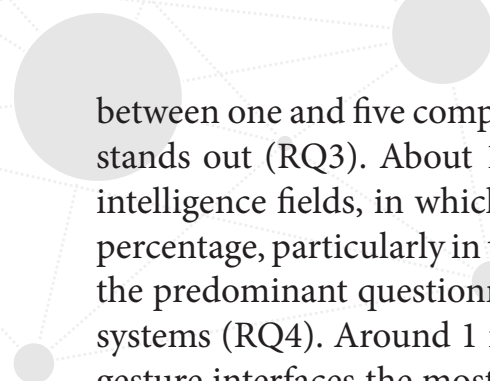
“UX Evaluation with Standardized Questionnaires in Ubiquitous Computing and Ambient Intelligence”



Dr. Gustavo López
Doctor en Computación
Universidad de Costa Rica

Resumen:

Background. Standardized questionnaires are well-known, reliable, and inexpensive instruments to evaluate user experience (UX). Although the structure, content, and application procedure of the three most recognized questionnaires (AttrakDiff, UEQ, and meCUE) are known, there is no systematic literature review (SLR) that classifies how these questionnaires have been used in primary studies reported academically. This SLR seeks to answer five research questions (RQs), starting with identifying the uses of each questionnaire over the years and by geographic region (RQ1) and the median number of participants per study (how many participants is considered enough when evaluating UX?) (RQ2). This work also aims to establish whether these questionnaires are combined with other evaluation instruments and with which complementary instruments are they used more frequently (RQ3). In addition, this review intends to determine how the three questionnaires have been applied in the fields of ubiquitous computing and ambient intelligence (RQ4) and also in studies that incorporate nontraditional interfaces, such as haptic, gesture, or speech interfaces, to name a few (RQ5). Methods. A systematic literature review was conducted starting from 946 studies retrieved from four digital databases. The main inclusion criteria being the study describes a primary study reported academically, where the standardized questionnaire is used as a UX evaluation instrument in its original and complete form. In the first phase, 189 studies were discarded by screening the title, abstract, and keyword list. In the second phase, 757 studies were full-text reviewed, and 209 were discarded due to the inclusion/exclusion criteria. The 548 resulting studies were analyzed in detail. Results. AttrakDiff is the questionnaire that counts the most uses since 2006, when the first studies appeared. However, since 2017, UEQ has far surpassed AttrakDiff in uses per year. The contribution of meCUE is still minimal. Europe is the region with the most extended use, followed by Asia. Within Europe, Germany greatly exceeds the rest of countries (RQ1). The median number of participants per study is 20, considering the aggregated data from the three questionnaires. However, this median rises to 30 participants in journal studies while it stays in 20 in conference studies (RQ2). Almost 4 in 10 studies apply the questionnaire as the only evaluation instrument. The remaining studies used



between one and five complementary instruments, among which the System Usability Scale (SUS) stands out (RQ3). About 1 in 4 studies analyzed belong to ubiquitous computing and ambient intelligence fields, in which UEQ increases the percentage of uses when compared to its general percentage, particularly in topics such as IoT and wearable interfaces. However, AttrakDiff remains the predominant questionnaire for studies in smart cities and homes and in-vehicle information systems (RQ4). Around 1 in 3 studies include nontraditional interfaces, being virtual reality and gesture interfaces the most numerous. Percentages of UEQ and meCUE uses in these studies are higher than their respective global percentages, particularly in studies using virtual reality and eye tracking interfaces. AttrakDiff maintains its overall percentage in studies with tangible and gesture interfaces and exceeds it in studies with nontraditional visual interfaces, such as displays in windshields or motorcycle helmets (RQ5).