Requirements analysis for customization using subgroup differences and large sample user testing: A case study of information retrieval on handheld devices in healthcare

Danielle Lottridge [a,*], Mark Chignell [b], Sharon E. Straus [c]

[a] Department of Communication, Stanford University, Building 120, Room 110, 450 Serra Mall, Stanford, CA 94305-2050, USA
[b] Department of Mechanical and Industrial Engineering, University of Toronto, Toronto, Canada
[c] Faculty of Medicine, University of Toronto, Toronto, Canada

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ABSTRACT

Requirements analysis defines the goals and evaluation criteria of system design. We introduce a methodology for requirements analysis for customization based on large sample interactive testing, with the premise that analysis of user behaviour with prototypes leads to requirements discoveries. The methodology uses a relatively large sample (1) to identify relevant user subgroups, (2) to observe significant empirically determined group differences in the context of task and tool use and (3) to estimate the groups' different requirements and derive design implications. Between 20 and 50 participants are used per test, rather than the three to five often recommended for user testing. Statistical relationships are investigated between subgroups in terms of background variables, questionnaire items, performance data, and coded verbal statements. Customization requirements are inferred from the significant differences observed between empirically determined groups. The methodological framework is illustrated in a case study involving the use of clinical resources on handheld devices by three groups of physicians. The groups were found to have different needs and preferences for evidence-based resources and device form factor, implying opportunities and necessities for group customization requirements.
Relevance to industry: In safety-critical domains such as health care, it is essential to assess user needs and preferences regarding devices and systems to inform appropriate customizations. We present a methodological framework and case study that demonstrates how large sample user testing can supplement typical methods of requirements analysis to provide contextualized, quantitative accounts of group differences and customization requirements.

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1. Introduction

Requirements analysis defines the goals of a design and forms the basis for evaluating subsequent implementations of the design. Methods of iterative design have been developed to handle unanticipated problems in user interaction that arise because designers cannot fully predict how people will respond to new or modified products and systems.

General requirements apply to all users, whereas customization requirements are required by certain subgroups of users and not by others. The motivation for customizing is that designs should accommodate the key characteristics and needs of each relevant user subgroup. Once customization requirements are identified, appropriate user interfaces can be developed for end-user customization, tailored according to their unique needs. The ability to customize is critical to accommodate the types of individual difference that have been shown to lead to very large performance differences (Egan, 1988; Mackay, 1991).

Requirements are commonly gathered with standard techniques such as focus groups, interviews, and ethnography (Cooper, 1999; Cooper and Reimann, 2003). We propose that it is critical to explore how users view a technology in the context of actual use to inform customization requirements, because interaction with appropriately selected artifacts can discover unanticipated requirements (Hutchinson et al., 2003). When dealing with novel products, in particular, people may be unable to express what they need until they work with the product. In this paper, we present a methodology where data are collected from a large sample, to identify user subgroups based on background variables in concert with performance data and preferences situated in interaction with

* Corresponding author. Tel.: +1 650 723 5499.
E-mail address: lottridg@stanford.edu (D. Lottridge).