ABSTRACT
This document describes the most relevant issues regarding development approaches for computer systems based on distributed user interfaces (DUIs). DUIs have brought about drastic changes affecting the way interactive systems are conceived and this affects the way these novel systems are designed and developed. New features need to be taken into account from the very beginning of the development process and new models, methods, and tools need to be considered for the correct development of interactive systems based on Distributed User Interfaces. The goal of this workshop is to promote the discussion about the development of DUIs, answering a set of key questions: How current UI models can be used or extended to cover the new features of DUIs?. What new features should be considered and how should they be included within the development process?. What new methods and tools do we need to develop DUIs in a correct way following the quality standards for interactive systems?.

Keywords
Distributed User Interfaces, Interactive Systems, Development Methods, UI Models and Tools.

ACM Classification Keywords
H.5.2 User Interfaces (D.2.2, H.1.2, I.3.6); Theory and methods; User Interfaces Management Systems (UIMS); Input devices and strategies.

INTRODUCTION
Distributed User Interfaces (DUIs) have recently become a new field of research and development in Human-Computer Interaction (HCI). The DUIs have brought about drastic changes affecting the way interactive systems are conceived. DUIs have gone beyond the fact that user interfaces are controlled by a single end user on the same computing platform in the same environment.

The term “Distributed User Interface” or “DUI” can be found in literature since just a few years ago [6, 7, 8], although the term has not been formally defined yet. According to [1] and synthesizing across different informal definitions in earlier works, they get the following definition: “A distributed user interface is a user interface whose components are distributed across one or more of the dimensions input, output, platform, space, and time” [1].

All this concerns affect the way these novel systems are designed and developed. New features need to be taken into account from the very beginning of the development process and new models, methods, and tools need to be considered for the correct development of interactive systems based on Distributed User Interfaces.

The goal of this workshop is to promote the discussion about the emerging topic of DUIs, answering a set of key questions: How current UI models can be used or extended to cover the new features of DUIs?. What new features should be considered and how should they be included within the development process?. What new methods and methodologies do we need to develop DUIs in a correct way following the quality standards for interactive systems?.
Other approaches include also a user model to characterize users’ features.

The $\mu_7$ concept summarizes the essential aspects to consider regarding DUIs [3]. These aspects are the multi-device, multi-platform, multi-user, multi-language / culture, multi-organization, multi-context and multi-modality implementation.

**Multi-device and Multi-platform usage**

A single user employs different devices at the same time, whether they are running the same operating system or not. Besides, multi-device usage subsumes a multi-platform usage (since there are different machines) but the reciprocal does not hold: a user could use several computers (hence, multi-platform) that are similar (hence, no multi-device). In a DUI scenario, the user takes advantage of these resources to improve the user experience [2].

**Multi-user and organization support**

One or many users may want to distribute parts or the whole UI among several monitors, devices, platforms, or displays. For instance, in a control room setup, users may want to direct portions of a UI to other displays of others users depending on the context of use.

**Multi-language / culture support**

The distribution of the UI among different users leads to the cultural adaptation of the UI. The distribution of the elements according to the cultural and the language aspects of the user is an important issue to take into account. For instance, the layout of the controllers for Chinese users differs from the English users.

**Multi-context of use**

The distribution of the UI depends on different aspects regarding the context the UI is being executed. These aspects may be related to the proximity of the environmental resources (i.e. the distance to displays), or may be related to the user profile (i.e. capabilities, role in the session, etc.) among many others.

**Multi-modality implementation**

The distribution of the UI is not limited to GUIs since vocal user interfaces may be directional. For instance, games developed for the Kinect platform are controlled using vocal and gesture –based UIs.

Indeed, the emergence of new interactive resources affects the development and evaluation of distributed user interfaces (DUIs) and introduces new aspects that should be taken into account regarding software engineering methods, models and tools.

Apart from these dimensions and concerns regarding DUIs, it is also important to consider quality factors within the development process.

**CONCLUSIONS**

The aim of this workshop is to conclude with a common development framework where we try to find out the answer on how the $\mu_7$ concepts affect the way in which software systems based on DUI should be developed. How $\mu_7$ concepts do influence every phase of the software life cycle starting from requirements to the final implementation.

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