

Supporting Context Changes for Plastic User Interfaces: a Process and a Mechanism

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ABSTRACT

Mobility coupled with the development of a wide variety of access devices has engendered new requirements for HCI such as the ability of user interfaces to adapt to different contexts of use. We define a context of use as the set of values of variables that characterise the computational device(s) used for interacting with the system as well as the physical and social environment where the interaction takes place. A user interface is plastic if it is able to adapt to context changes while preserving usability. In this paper, we present a process and a software mechanism that support context changes for plastic user interfaces. We propose to structure adaptation as a three-step process: recognition of the situation, computation of a reaction to cope with the situation, and execution of the reaction. Reactions are specified in an evolution model which, in turn, is executed by a context supervisor. This supervisor is notified of context changes by a software probe that automatically detects deviations from the current situation. When notified, the supervisor executes the evolution model, and, when possible, adapts the user interface to the new context of use.

MOTS CLES : Interaction Homme-Machine, plasticité, adaptation, contexte d'utilisation, plate-forme, environnement.

KEY-WORDS: Human Computer Interaction, plasticity, adaptation, context of use, platform, environment.

INTRODUCTION

Recent years have seen the introduction of many types of access devices including Personal Digital Assistants (PDAs) and mobile phones (Cf. Figure 1). Systems like CyberGuide [1], the office assistant [21] and Welbo [12] all aim at providing the user with context-relevant information as the user moves around. New interaction techniques are being developed to support human tasks while hiding the computer away. These include transforming the PDA into a universal remote controller

[17], transferring data between PDAs by picking and dropping [14], and augmenting real world objects with computational facilities [2, 11]. Flexibility becomes more important: when the battery gets low, users may want to switch from their portable PC to the PDA without losing any contextual data. Similarly, they may want to switch from the PDA to a wall-sized electronic white board to share information in a more efficient way with a colleague passing by. These examples demonstrate that adaptation of interactive systems to context changes is becoming a major issue in HCI.

In this article, we address the problem of adaptation to context changes for plastic user interfaces [20] [4]. We recall the definition of our notions of plasticity and context of use, then describe the process and a software mechanism we propose for supporting adaptation to context changes. We illustrate the discussion with the EDF home heating control system, a system we have developed according to our plasticity-related principles.

AN EXAMPLE: THE EDF HEATING CONTROL SYSTEM

A heating control system allows users to set the level of comfort in the home for different periods of the day. It also provides facilities for programming standard heating behaviour during weekends and vacations. The heating system is controlled with a dedicated wall-mounted device. EDF (the French Electricity Company) is willing to offer new interaction modalities using a variety of access devices suitable for different environments.

