

Chapter 6

Meeting the Needs of Diverse User Groups: Benefits and Costs of Pluggable User Interfaces in Designing for Older People and People with Cognitive Impairments

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ABSTRACT

“Pluggable user interfaces” is a software concept that facilitates adaptation and substitution of user interfaces and their components due to separation of the user interface from backend devices and services. Technically, the concept derives from abstract user interfaces, mainly in the context of device and service control. Abstract user interfaces have been claimed to support benefits such as ease of implementation, support for User Centered Design, seamless user interfaces, and ease of use. This paper reports on experiences in employing pluggable user interfaces in the European project i2home, based on the Universal Remote Console framework, and the Universal Control Hub architecture. In summary, our anecdotal evidence supports the claims on the benefits, but also identifies significant costs. The experience reports also include some hints as to how to mitigate the costs.

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INTRODUCTION

Today, home devices and appliances come with user interfaces that are either built into the devices or are dedicated remote controls. For example, a washing machine has built-in dials and knobs to select the wash program parameters and start or stop the washing process. Additionally, a display may be integrated into the appliance to provide status information. All these controls are built into the washing machine - the user cannot take them away in order to control the appliance remotely.

Some home devices have a remote control in addition to a built-in user interface. This remote control is dedicated to the device or service it controls. For example, a DVD player usually ships with an infrared remote control, in addition to the buttons and small displays on the device itself. The user can choose between the dedicated remote control and the built-in user interface to control the DVD player. However, they cannot use the TV's remote control to play a DVD.

Universal remote controls are advertised for being the solution to the problem of having too many remote controls at home. Certainly, infrared-based universal remote controls are an improvement to dedicated remote controls since they allow controlling a variety of devices from a single ("universal") controller. However, universal remote controls have to be programmed prior to usage in order to know the infrared codes of a particular device. Moreover, they cannot provide feedback on a device's current state, such as whether it is currently on or off. Some advanced universal remotes, such as the high-end Logitech Harmony products, make guesses about the device state, but this is not always reliable.

Pluggable user interfaces allow the user interface to be adapted or substituted for one or multiple devices and services to be controlled. We refer to "pluggable user interfaces" as an architectural concept in device/service control that separates the user interface from the backend functionality in software, and sometimes in hardware (Zimmer-

mann & Vanderheiden, 2007). An abstract user interface or "user interface model" is established as the dividing line between backend application (devices/services) and frontend application (user interface). In the area of user interfaces, the concept of "pluggability" at runtime is not present in today's typical design and development environments. Following the pluggable user interface approach, the user interface of a device or service is exchangeable, and can be attached or detached at runtime as appropriate. For example, for controlling a DVD player, one user might use a PDA with voice interaction, and another might use an infrared remote control for navigating the DVD controls on a TV screen.

The pluggable user interface concept supports a wide range of user interface needs and preferences. One device/service implementation, providing an abstract user interface, can host different versions of pluggable user interfaces, in order to serve different users in different usage contexts. This is particularly useful when designing user interfaces for elderly users and users with cognitive disabilities who represent diverse groups of users with regard to their user interface needs and preferences.

BACKGROUND ON HCI AND AGED USERS

There is a growing interest for designing and developing human-computer interfaces that fit the needs of the aged users. The interface's specific characteristics have to conform to the performance of older users. Design considerations include variations of the visual, auditory, cognitive and motor functions associated with the process of aging, but other considerations such as emotional, health and social aspects have to be taken into account as well.

It has been found that, related to aging, a decrease of human functions takes place. This includes a reduction of visual function, of sen-

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