

Design of Usable Multi-Platform Interactive Systems

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ABSTRACT

Recent years have seen the introduction of many types of computers and devices. In this SIG we want to discuss how to provide developers with tools, methods and languages able to support both the development of single interactive applications for multiple platforms and the dynamic execution of these applications in a changing environment while preserving usability. Since CHI is the most important conference on human-computer interaction, it is the most suitable place where to discuss such issues, the results achieved so far, compare them with other results obtained by other groups in the world and discuss the opportunity provided by joining efforts.

Keywords

Context-dependent Interactive Systems, Multi-platform Applications, Model-base Design, Usability.

INTRODUCTION

Recent years have seen the introduction of many types of computers and devices. In order to perform their tasks, people now have available a wide variety of computational devices ranging from cellular telephones, personal digital assistants (PDA's), to Internet enabled televisions (WebTV) and electronic whiteboards powered by high end desktop machines. Users wish to be able to seamlessly access information and services regardless of the device they are using, even when the system or the environment changes dynamically. To this end, computer-based applications need to run on a wide spectrum of devices, and should adapt like a chameleon to the changing context of use. For software developers, this introduces the difficult problems of constructing multiple versions of single applications and endowing these versions with the ability to dynamically respond to changes in context such as network connectivity, user location and ambient sound and lighting conditions. In this SIG we want to discuss how to provide developers with tools, methods and languages able to support both the development of single interactive applications for multiple platforms and the dynamic execution of these applications in a changing environment while preserving usability.

Creating different versions of applications for different devices engenders extra development, and maintenance

cost and complicates the problems of configuration management. A proliferation of versions dilutes the resources available for usability engineering, and requires expensive maintenance of cross-platform consistency of the user interface. Additionally, current software architectures and development tools provide little support for creating applications that change dynamically in response to changes in their environment and context, or that must share data amongst heterogeneous device types.

Many dimensions must be considered, specifically, context of use may vary over:

- Actors: e.g., their number, their interests, the tasks enacted by each user
- Platforms: e.g., device kinds, number of devices, device resources: screen size, sound capabilities
- Environments: e.g., location, location properties (e.g., ambient noise, lighting)
- System Resources: e.g., network availability, latency, bandwidth, CPU, memory

Context of use may vary over all these dimensions and their mutual links. For example, a PDA held in one's hand near an electronic device could become a universal remote control for handling the device.

To address these issues some projects have recently started such as the CAMELEON project (<http://giove.cnuce.cnr.it/cameleon.html>) that involves ISTI-CNR Pisa (coordinator), University of Grenoble, University of Louvain, Motorola Italy, IS3 and the CONSENSUS project (<http://www.consensus-online.org>) that involves SAP (coordinator), CURE, IBM, Nokia, Fujitsu.

Within this large problem space, the SIG will focus on variation in the interaction resources available to an application. Examples of such resources include basic platform capability, accessible display area, sound and tactile interaction channels and network bandwidth. These resources vary according to the type of device on which the application runs, as well as the physical and environmental conditions. We choose to concentrate our efforts on these problems because it has become difficult to develop applications which may have to run under very varied

conditions of available resources and where such resources may change radically during execution. In particular, variability in resource affects our ability to predict and ensure the usability of the application.

We want to pay attention to systematic methods to support the design of usable systems, tools supporting such methods, representations able to formalize the information that the methods require and runtime techniques able to provide dynamic support. In particular we want to consider model-based approaches: as Myers and others [3] pointed out the increasing availability of new interaction platforms has raised a new interest in this approach in order to allow developers to define the input and output needs of their applications, vendors to describe the input and output capabilities of their devices, and users to specify their preferences. Then, a model-based system can choose appropriate interaction techniques taking all of these into account.

In addition issues related to the production and utilization of cross platform user interface guidelines will be raised.

SIG PARTICIPANTS

One of the purpose of this SIG is to facilitate communication between researchers working on related projects and possible users of the results of such projects. In particular people involved in mobile HCI issues will be the target group of this SIG.

We foresee three types of users of such results:

- companies whose business is in developing multi-context applications that can be interested in using methods, models and tools developed,
- end-users who would like to have applications obtained using the developed approaches,
- and universities and research institutes that will be interested in the tools for teaching purposes and for their projects.

We will organise a mailing list for SIG participants, along with a Web site with the possibility of having full access to the working papers, tools and deliverables of the related projects.

SIG ORGANIZATION

The activity plan for the SIG is:

- Introduction of the SIG goals and participants (10 minutes);

- Presentation of tool support for model based design of multi-platform user interfaces (10 minutes - Fabio Paternò), discussing tools supporting development of the relevant models and transformations among the information that they contain;
- Discussion of usability issues in multi-platform user interfaces (10 minutes – Manfred Tscheligi), discussing how to represent information contained in relevant models in XML-based languages based on user interface guidelines.
- Interactive discussion with participants on the research topics discussed, selection of those that seem more important, and comments on the solutions proposed (30 minutes).
- Discussion on future plans, in particular on how to create a common background in this area among those who are interested in it and how to influence international bodies such as W3C consortium, ISO, European Commission, National Science Foundation (30 minutes).

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