Designing User Interfaces for Television

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ABSTRACT
In this paper, we describe a tutorial to enable CHI participants to design more effective user interfaces (UIs) for interactive television (ITV) and World Wide Web (WWW) applications used on televisions (TVs).

Keywords
Television, World Wide Web, Internet appliance, kiosk, remote control, UI design, usability evaluation

INTRODUCTION
ITV and the WWW are the offspring of mergers between the computing, telecommunications, and entertainment industries. They involve high-speed networking, digital servers, encoding and compression of multimedia data, entertainment and information appliances, and platform-transparent applications software. Concepts such as on-line merchandising and video-on-demand have clearly evolved from the entertainment industry.

Most ITV and some WWW applications are used in homes. The primary multimedia electronic display in the home is the TV, with its infrared remote control as input device. This is in contrast to most computing environments, which provide a high resolution display, keyboard, and mouse. Approximately 94% of U.S. households today have a TV with a remote control; 75% have two or more. In contrast 40% of people recently polled by Nielsen Media Research live in a household with a computer [1].

Thousands of homes have participated in successful ITV trials, including the Time Warner Full Service Network in Orlando and the US West Omaha trial. Cable carriers and telecommunications companies alike are putting into place the infrastructure needed for service expansion to wider areas for Internet commerce on TVs.

Approximately 51 million people in the U.S. and Canada have access to the Internet [2]. While many of these users access the WWW from their computers at work, a growing number do so from home. The Internet appliance, a low cost device to enable Web access from home via telephone line or coaxial cable, generally relies on the use of TVs and specially designed remote controls and keyboards.

A growing number of CHI professionals with experience in developing computer UIs are encountering difficult issues when designing interfaces for TV. This tutorial provides the design knowledge, tools, and strategies required to create successful UIs for TV. It also teaches how to evaluate TV interfaces to ensure a high level of usability among the viewer population.

Some typical questions that participants should be able to answer after the tutorial are:

- How do TV display technologies differ from high resolution computer displays?
- How should I design colors, fonts, and screen layout for TV displays?
- How do infrared remote controls and keyboards differ from standard computer input devices?
- How do I design for pointing, selection, navigation, and data input with a remote control?
- Can I retrofit an existing computer UI for TV?
- Do TV viewers differ from computer users in their capabilities and perceptions?
- How do I test the usability of a TV UI?

INTRODUCTION AND BACKGROUND
The tutorial scope will be defined, and the qualifications of the authors will be described. Participants will understand why designing for TV is becoming more important, and that it is different from designing for computers. The major characteristics of ITV technology will be described and compared with broadcast and cable TV, network computing, and high definition television (HDTV).

VISUAL AND INTERACTION DESIGN FOR TELEVISION
In this part of the tutorial, Dale will provide the major conceptual background covering the differences between computer and TV display technologies, including resolution, cropping, safe areas, international display formats, compression, and background audio and cueing.

He will describe TV designers' tools, applications, and system requirements, comparing and contrasting them with those used for computer UI development. He will describe the design and direction process, using examples from the Time Warner Full Service Network (FSN). Guidelines for visual and interaction design and demonstrations of good and bad designs will be presented. Solutions will be provided for overcoming the limitations of TV which commonly degrade UI designs, including screen cut-off, color and font problems, "blooming", and navigational constraints of the remote control. A group exercise will enable participants to recognize the power of the design techniques described. The special requirements of designing interactive information kiosks with TV touchscreens will be considered.

INPUT DEVICE DESIGN FOR INTERACTIVE TELEVISION

In this section Anna will describe the conceptual differences in technology, functionality, and ergonomics between TV remote control devices and standard computer keyboards and mice. She will describe the design, development, and production process for creating a usable input device for ITV, using examples and artifacts from the Time Warner FSN remote control [3]. She will also cover the special UI challenges in development of these devices, including ergonomic issues, task limitations, end-user programmability, and universal features.

USABILITY EVALUATION FOR TELEVISION

In this section, Anna will highlight the differences between user evaluations of ITV and computer applications. She will discuss the development of user profiles, including the demographic and psychographic differences between TV viewers and computer users. She will describe the design of Living Room and other unique lab environments for testing TV, as well as the adaptation of existing facilities and the use of homes. She will discuss how standard usability testing methods and metrics may be adapted to ITV and Web user evaluations, as well as automatic data collection metrics available through cable network technologies. She will also cover the special challenges involved in testing TV applications compared to computer programs.

FUTURE OF THE INTERACTIVE EXPERIENCE IN TELEVISION

Near-term changes in TV technology will include digital TV, HDTV, broadcast TV with interactive graphics enhancements, miniaturization, and emergence of hybrid television/ computer appliances. Dale and Anna will discuss how these changes will impact the viewer experience and present new challenges to UI designers working in the medium by the year 2000.

ABOUT THE AUTHORS

Dale Herigstad has been a director/designer of motion graphics for television and film since 1978. He has an MFA in Design from California Institute of the Arts. He has worked at most of the major production and TV design firms on the West Coast, including Robert Abel & Associates, Digital Productions, Pacific Data Images, Rezn8 Productions, and Rhythm and Hues. He designed broadcast packages for the major networks, as well as on-air graphics for several Winter Olympics for CBS. Since 1991, Dale has also been active in interactive design. He was Art Director on TCI's First Screen ITV prototype project and the Time Warner FSN project in Orlando, Florida. In 1996 he was Creative Director of the Interactive Design department at Pittard Sullivan. He also designed kiosks for Nissan and Pittard Sullivan. Dale has won the Broadcast Designer Association Award, as well the New York Film Festival design award and an Emmy.

Anna Wichansky is an applied experimental psychologist who specializes in the study of how users interact with new technology. She has a M.S. and Ph.D from Tufts University and A.B. from Radcliffe College. She has researched, developed, and tested UIs for transportation, telecommunications, electronic instrumentation, hardware, software, and computer graphics products since 1976. She managed technical development of the remote control used in the Time Warner FSN trial for Silicon Graphics, Inc., where she also designed the ITV Living Room and Kitchen. She currently manages the Usability Engineering Labs at Oracle Corporation, where she contributed to the design and testing of the NC™ network computer and was responsible for the Internet Living Room and Classroom labs.

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