Graphical User Interfaces: The Success (or Failure) to Navigating the InfoBahn

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Abstract

The graphical user interfaces being designed for consumer broadband television devices will play a crucial role in determining the success – or failure – of current and future services. These initial user interfaces will train viewers to navigate the wealth of programming and services available through new technology. An effective graphical user interface will encourage viewers to use the services currently being offered, and to be receptive toward future services. If the user interface makes it difficult to use initial services, the viewer may not be receptive toward new services.

This paper will explore these issues..

Couch Potato Mode -- Or That's Entertainment

As people spend more time managing work and home responsibilities, they have less to spend in front of the television set. When viewers do turn on the television, they expect to be entertained. They are in the relaxation, -- a.k.a. "couch potato" -- mode. Television is meant to be easy, mindless. Despite hundreds of choices, graphic user interfaces should make locating something to watch effortless. The last thing the viewer expects to see is a DOS prompt on the television screen.

Choices, Choices, Choices: It's Not Just Television Anymore

Hundreds of channels of program offerings. The power to watch what you want at your convenience. Digital stereo audio and wide screen televisions for home entertainment theaters. Secondary audio programming for multi-lingual households. Downloaded video games, CD-quality commercial-free music programming and home shopping all available at the press of a remote control button. The good news is that convergence of computer and broadband television technologies provides viewers greater variety in television programming *and* services. Viewers have more control over what they watch and how it is delivered.

The not-so-good news is that the video tuning device that enables these choices is more sophisticated. Channel surfing is still possible, but it no longer allows the viewer to maximize his or her viewing pleasure potential. The viewer must interact more frequently with the device, not only to find something to watch or select a service, but to modify the manner in which this program or service is delivered. If the household is Spanish-speaking, the device would display all graphical user interface text in Spanish and to tune all Spanish language audio where available. If the viewer is the only Spanish-speaking member of a household, he would like to enable Spanish language features during his viewing sessions only. Technology being developed enables these capabilities; there is little doubt that the viewer would use a few of them. The question is: *will* the viewer use them? The graphical user interface is the key. The on-screen graphics will either empower viewers to take full advantage of everything the technology makes available or frustrate them so they will not appreciate the power of the technology.

The Challenge

Graphical user interfaces on televisions, VCRs, satellite receivers and cable terminals will be challenged to entice viewers to relax in front of the television set. Viewers will be inclined to spend more of their ever-decreasing spare time in front of the television set if the technology, and the graphical user interface that drives it, makes the experience fun and rewarding. Viewers will want to spend more disposable income on television programming and services -- both now and in the future -- if they feel the programming, the services, and the power of the technology enhance their family's home entertainment experience. Graphical user interfaces will play a crucial role in determining this feeling of satisfaction and value.

Graphical user interface systems being designed for consumer broadband video products will be a training ground for viewers. The assumption is that ever-increasing home computer sales or office or school computer use will prepare viewers for new interactive services or next-generation consumer broadband video equipment. This assumption may not be completely accurate. The level of confusion tolerated when operating a computer at home to reconcile one's finances, at school to finish one's term paper, or at work to create a slide presentation, may not be tolerated when trying to operate the electronic program guide to determine what is on television. This low tolerance level could be especially evident when one has limited choice in the video equipment or services offered by the broadband network service provider. Care must be taken to design graphical user interface systems that train viewers to interact differently with their television sets. A successfully designed graphical user interface will entice the viewer to use features and services that are complex without appearing to be. The learning curve should be shorter than that of learning how to operate most computer software. And over time, the viewer should not only feel confident navigating current service offerings, but also comfortable enough to subscribe to new ones when offered.

Potential revenue generating capabilities from new technology will depend on how comfortable viewers feel operating these initial systems. If the electronic program guide is frustrating to work, viewers will not use it. They will not pay for the service, and they could be disinclined to experiment further with other interactive services. If purchasing and watching a near video-on-demand (NVOD) movie is complicated, viewers will not purchase many NVOD events. Furthermore, they will be less likely to experiment with video-on-demand (VOD) services when they become available.

Key Design Issues To Consider.

Design From the User's Perspective

Designing a user interface from the user's point-of-view is easier said than done, but it is crucial in developing products that people can use intuitively. User-centered design means anticipating the user's expectations and questions then using design to address them. Instead of relying on explicit user manual directions to explain the product's capabilities, the designer relies on the design of the product's user interface itself as a guide through procedures. This design approach tends to be complicated because the designer becomes too familiar with the product's features and capabilities. It is easy for the designer to momentarily forget that the user does not have the same product knowledge. The designer must constantly ask himself: 'If I had never used this product, what would be my expectations of how it works? What are the design clues suggesting I do? Based on the patterns I have used so far, what would the user expect to do?'

A well-designed user interface does more than work with the current expectations of the customer. A successful user interface coaxes the user into trying unknown features. For example, most users would assume that an electronic program guide would tell what programs are on now and in the future and that the graphical user interface would help navigate through the guide. Users may not be aware that the program guide would allow them to sort and display programs by themes. The graphical user interface should suggest that this possibility exists and effortlessly guide them through the steps. Enticing and guiding users through the unknown in a stress-free fashion are the most important objectives of any graphical user interface. These are the paramount objectives of the graphical user interfaces being designed for consumer broadband television devices. How well these products can do this today could determine how willing viewers will be to use services tomorrow.

Testing. Testing.

The development of intuitive graphical user interface systems requires the early and continuous involvement of users throughout the development cycle. While focus groups, surveys and mall intercepts can be informative, the only real way to determine if a concept works is to test it on a typical user. Once the designer has an idea, a prototype is developed and given to someone who represents the type of person who would use this product. This person should not be familiar with the product or the interface. The subject, alone in a room with the prototype and the person conducting the test, is asked to complete certain tasks, but is not assisted in anyway by the tester. The tester watches how the subject interacts with the prototype. Ideally the subject would be videotaped and the tapes made available for study throughout the design process. Upon test completion the tester would interview the subject to determine why he approached tasks in that particular manner. The feedback from such testing tells the designer what elements work and do not work, and why. Videotape reviews allow the designer to learn helpful behavioral clues. This information is then incorporated into the design.

This type of testing can be used to analyze the effectiveness of a concept implementation or screen composition, or to choose between several implementation ideas. Unlike surveys and other types of market research, user testing sample size need not be large because the objective is to observe how the subject interacts with the design in order to improve it. One need not test 100 subjects if the first ten behave similarly. This is especially true if the sessions are videotaped because the tapes provide firsthand information. Once the design is complete, user testing should be conducted to determine if it is indeed easy to use. Feedback from testing can be incorporated into the design prior to release, or in the next release of products.

Helpful Help.

Even the most intuitive graphical user interface system needs to provide help instructions. Not everyone approaches unknown tasks the same way. Some people take chances when they reach a point of uncertainty, pressing buttons and dealing with the results. Others feel intimidated and will not proceed without seeking help first. Well-designed graphical user interface systems accommodate both groups of users.

Help can be categorized into two groups, general help, and specialized help. General help describes basic navigational and operational procedures. Specialized help is function-specific. While the basic navigational information may sufficiently execute a specific function, this may not, for some reason, be apparent to the user.

The risk-averse users must be able to access specialized help on a specific function and read that its execution is no different from other known functions. The graphical user interface designer is free to implement these types of help; the only requirement being that they are easily accessible.

Mistakes Should Not Be Fatal.

For those who are willing to take risks, mistakes cannot be traumatizing. Pressing the wrong key should not confuse the user. Incorrect buttons are pushed and wrong choices are made, both intentionally and by mistake. Choice confirmation and the ability to return to a previous screen or exit the graphical user interface system entirely are ways to restore user control when a mistake occurs.

Remote Controls Are Equally Important

Less is more; versus more is better. There are many schools of thought on the number of buttons that should be on the remote control. Actually, the most important thing is the ease with which a user can locate the buttons. The feel of the remote control in one's hand also is important. Is the remote control big and awkward? Are the buttons big enough given their importance to the user interface? Are the most frequently used buttons easily accessible? Are the labels easy to see in dim light? There are many, many styles and price ranges from which to choose. While price is a major factor in choosing a remote control, cost savings gained from choosing an inexpensive but difficult-to-use unit can be wiped out by the loss in service revenue because the remote control inhibits the user's access to services.

Conclusion

Broadband television technology will provide viewers with more programming and service choices. Unfortunately, technological advances in other areas of life are leaving viewers less time and disposable income to spend on these new and exciting services. This increases the importance of the graphical user interfaces currently being developed for consumer devices. Graphical user interface systems designed from the user's point of view instead of the designer's point of view will be more successful in empowering users in navigating the many choices made available to them. The more comfortable viewers feel navigating the InfoBahn today, the more likely they will be willing to access it tomorrow.

Managing the Return Spectrum to Optimize Interactive Revenue Opportunities

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ABSTRACT

Issues related to reverse transmission in cable plant are considered. A topology is described which removes the largest portion of the interference in the return band. A few of the issues related to protocols suitable to return data are mentioned, and the idea of spectrum management is introduced.

INTRODUCTION

For years the cable industry has had available technology that *almost* enabled the return band from 5 to 30 MHz. Some systems have employed the return band to transport video from local venues to the headend, and a very small number of systems have employed the return path to retrieve data from homes. However, little use has been made of the return spectrum until now. Cable operators have recognized that they will have to provide return for new services, however, and most systems now either have return path or can add it. In the days when systems were built according to tree and branch architectures (and there are a lot of such plants still in use), the return band was frequently considered impractical to use. However, with the modern fiber to the node architectures, the return band is usable.

A survey of several cable operators indicated expectation of revenue from services using reverse spectrum, ranging from $3.00 per month (average for 100% of homes served) to over $50.00 per month (in 25% of homes served). Revenue comes from such services as on line service (Prodigy, AOL, Internet, etc.), telephony (including long distance access) and interactive advertising.

ISSUES IN SELECTION OF A FREQUENCY PLAN FOR UPSTREAM USE

Any attempt to set a frequency plan for upstream traffic must first take into account existing services if any. Most of the existing services are either video return from remote venues, or impulse pay per view systems with RF return. While we expect future services to be controlled with some sort of intelligent system, existing systems will continue to be controlled manually. Future control systems are discussed below.

Interfering carriers will also render some frequencies inoperable for all except perhaps very low data rate services. A review of the literature suggests that frequencies below 10 MHz are very difficult to use, and that frequencies above 20 MHz are much less susceptible to interference. A point of concern with the use of frequencies above 30 MHz, is the potential for interference to TVs and other devices connected to the cable. TVs in North America use the band from 41-47 MHz as their intermediate frequency. A typical level for a return signal leaving the home, is about 50 dBmV according to current thinking. This is as much as 50 dB above the incoming signal the TV is receiving. If a significant part of the upstream energy strikes the TV (due to limited coupler isolation), then interference is possible.