

Dashboard for Controls

infoComm
INTERNATIONAL®

Integrators Guide

A Companion

to the Dashboard for

Controls Design Guide

and Design Reference

VHS
PLAYER

AUDIO
CASSETTE

SATELLITE
RECEIVER

LOCAL
PC

TABLE
LAPTOP 1

TABLE
LAPTOP 2

TABLE
LAPTOP 3

TABLE
LAPTOP 4



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Preface

The Dashboard for Controls Integrators Design Guide was developed by audiovisual industry volunteer experts with the support of InfoComm International®, the trade association representing the audiovisual industry.

Its development has been ongoing as a complement to a broader “Dashboard for Controls” effort that began in 2004 through an initiative of the Technology Managers Council of InfoComm. The Dashboard’s basic premise is that operation of a professional AV installed system should be as easy as driving a car.

To that end, this document, along with companion documents Dashboard for Controls Design Guide and Dashboard for Controls Design Reference Guide, provides guidelines for creating AV user interfaces.

The guide is targeted to the product “supply side” integrator. It is hoped that readers find this a useful resource for exploring design options, navigation formats and anatomy of AV user interfaces.

Dashboard for Controls

Table of Contents

Prefaceii

Acknowledgments.....ii

Introduction.....iv

Determining Factors in Design and Integration

1. AV System Types1

 a. Simple Presentation1

 b. Presentation/Conference Hybrid1

 c. Communication1

 d. Distribution2

2. End-User Considerations

 a. Frequency of Use2

 b. Technical Knowledge2

 c. User Confidence.....3

3. Touchpanel Navigation Formats3

 a. Linear Hierarchy.....4

 b. Progression Hierarchy6

 c. Control Panel9

4. Panel Size11

Interface and System Design Glossary.....12

Conclusion16

A Companion
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Controls Design Guide
and Design Reference

Introduction

The Dashboard for Controls Integrators Design Guide aims to:

- Outline and illustrate four categories of audiovisual system configurations
- Explain end-user considerations
- Offer three navigation structures for touch screen control systems
- Provide a glossary of audiovisual system and interface design components

The Guide explores several working variations of audiovisual control interfaces designed for a wide range of end-users. Once a designer has identified the type of AV system, the skill level of the end-user(s) and the capabilities required of the control system, an appropriate navigational model must be identified that matches the needs of the end-user.

The designs outlined in this document are based on system functionality, which works in collaboration with the user needs, navigational format, and touchpanel size. The underlying goal is to establish industry benchmarks that will eventually provide the user community with consistency in system and interface experiences while still happily coexisting with unique and customized AV system design. Interface designs and navigational formats should apply equally to corporate, education and government clientele.

Like any automotive dashboard, the Dashboard for Controls embraces the uniqueness of application and style of the interface designer. When designing with this guideline, control systems industry professionals have sufficient latitude to create “signature” control interface products. Some designs may have a utilitarian approach, while others may present a refined graphic appeal while still following the guidelines presented here and designing for user needs.

It is assumed that end-users may need to be trained on the system prior to first use. However, after that first use, and by exposure to similar Dashboard implementations, a user should rapidly gain confidence with Dashboard-observant systems.

This version of the Dashboard Templates is intended specifically for interface designs and touchpanels that are created for resolutions 640 x 480 and higher. However, many of these recommendations could be successfully adapted to smaller touchpanels.

Determining Factors in Design and Integration

When determining how to proceed with designing controls, the designer or integrator can examine factors that include AV system types, end-user considerations, touchpanel navigation formats, and panel size. For details regarding commonly used terms, please refer to the Interface and System Design Glossary provided after this chapter.

1. Audiovisual system types

There are four common commercial system designs:

- Simple Presentation
- Presentation/Conference Hybrid
- Communication
- Distribution

These system designs are based on operational modes such as:

- Presentation
- Audioconference
- Videoconference
- Recording
- Environmental control and
- Advanced or technical functions.

These modes can suggest functionality and effective navigational formats.

a. Simple Presentation

Simplest of systems designed to control audio and video routing to a single destination, generally with some local environmental control.

b. Presentation/Conference Hybrid

Designed to control simple audio and video routing to multiple destinations, some local environmental control, and audioconferencing.

c. Communication

Designed to control a video codec, presentation sources, and environmental controls. This is often considered the most technically demanding of system designs that can be utilized by the novice user.

d. Distribution

Commercial system related to entertainment, i.e. bar, restaurant, or casino designed to control multiple sources and destinations via matrix switching with environmental controls. This type of interface is not covered in this document beyond this description because the complexity of the interface design is outside the scope of this document.

Hybrids of the core systems mentioned here could include the addition of recording, password entry / modification, technician controls i.e. auto shutdown, time and date setting, divisible room control, remote access, and preset management. While not represented specifically, each of the system types outlined are assumed to contain at least some of these functions.

Highly specialized systems related to government agencies, the medical industry, information systems, asset management, and industrial equipment control are not as common and are not currently listed because their complexity is outside the scope of this document.

2. End-User Considerations

The system and interface designers should make it a priority to obtain specific knowledge of the user and the environment. Complexity is less of an issue when information is presented in a manner consistent with the user's comfort and experience by way of an appropriate navigation and touchpanel size.

The type of user can generally be described using three basic parameters: frequency of use, technical knowledge and user confidence or familiarity.

a. Frequency of Use: Single / Moderate / Frequent

The amount of use a system will receive from a single user may determine the navigation format and interface the designer will provide. An infrequent user will not remember complicated procedures, and thus may require additional guidance from the system itself. This may take the form of a wizard or a single page drill down interface with fewer options available and more verbose descriptions. A more frequent or even daily user will be able to learn a very complex system through repeated use and operate the system based on memory.

b. Technical Knowledge: Novice / Intermediate / Advanced

Users who have a high comfort level with very technical systems (such as IT professionals and on-site technicians) are generally not intimidated by the complexity of technical systems. Although this is not always the case, advanced computer users can often master an audiovisual control system very easily because of existing conceptual models and their familiarity with many types of computer based systems. Novice technical users (often including high-level executives) are often intimidated by the slightest complexity; combine this with infrequent use, and very often these users have low confidence in their ability to use audiovisual systems.

c. User Confidence

End-user confidence, high or low, is the result of the users frequency of use and technical knowledge. User confidence can often be increased through improved training (increasing his or her technical knowledge) or increased use. Since it is sometimes difficult to ascertain the user's level of confidence without witnessing use of a completed system, user confidence often must be extrapolated from the combination of the two former user profile categories.

3. Touchpanel Navigation Formats

Once the designer has researched the application and the user, it is time to review navigational styles that match the application. A simple breakdown of navigational styles is presented in the chart.

	Presentation System	Presentation Hybrid	Communication System
Novice User (infrequent use)	Wizard	Wizard / Menu	Menu / Control Panel
Intermediate User (moderate use)	Wizard / Menu	Menu / Control Panel	Control Panel
Advanced User (frequent use)	Menu / Control Panel	Control Panel	Control Panel

Although this chart is a very simplified guideline, it reflects the primary intent of the Dashboard for Control documents. User-centric design seeks to provide guidelines that will serve as a point-of-departure for the novice or intermediate designer and to suggest limiting design options, with the goal of making AV interfaces more familiar, and as a result, easier to use. As a designer becomes more advanced, he or she may implement more nuanced hybrids of these styles while continuing to maintain the familiar navigational patterns for usability.

Defined here are three typical touchpanel control system navigational formats:

- Linear Hierarchy (Wizard or Drill Down)
- Progression Hierarchy (Menu Navigation)
- Control Panel (Global Navigation)

Navigational formats are based on a series of Human Factors practices and established interface formats that have been developed over the last decade for computer software and tactile interface development. More research sources for this work can be found in the InfoComm Dashboard Design Reference.

Please note: Samples are provided for the purpose of illustration only rather than to advocate or promote any specific layout or aesthetic. These determinations must be made based on the requirements of individual systems and specific user needs. The following templates describe the three basic navigation formats, along with recommended variations.

a. Linear Hierarchy (Wizard or Drill Down Navigation)

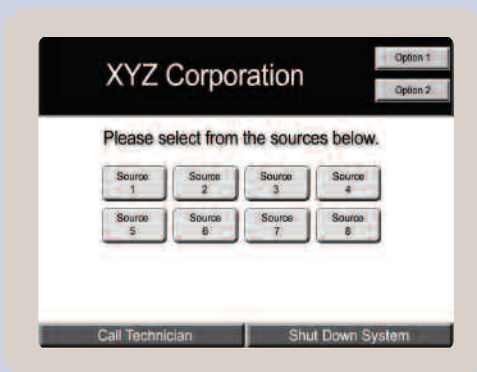
“Wizard” Structure

This design requires that a series of linear choices be made, guiding the user to a desired function or device. As a result, functions are several layers deep in the page or sub-page sequence structure. A popular use of the Linear Hierarchy pattern is the ubiquitous iPod interface. Linear Hierarchy provides the user with detailed instructions while presenting him or her with the fewest choices possible. This pattern is not very efficient due to the number of choices that users must make to reach their goal, as well as the time required to read each page for guidance.

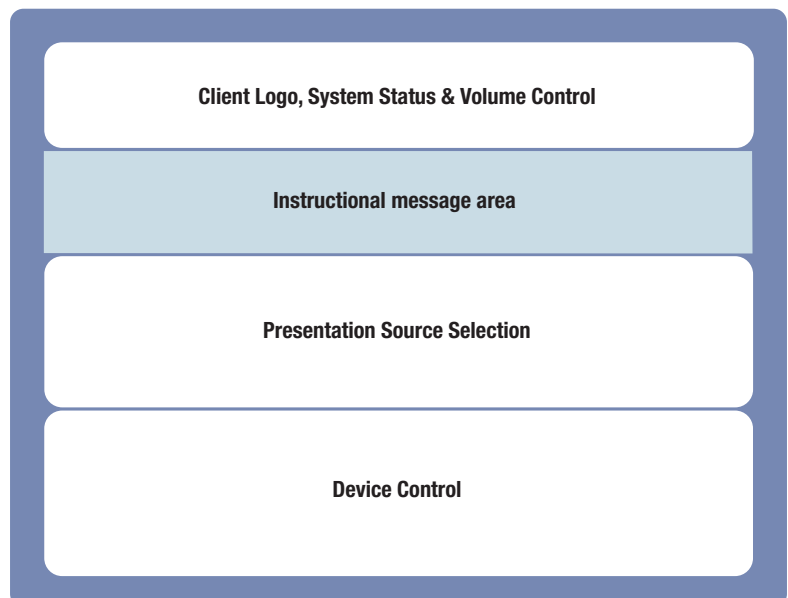
Some Linear Hierarchy designs may defeat the simple nature of the format when the technical complexity increases as the user “drills down” more deeply into the structure. For example, some videoconference hardware requires the user to make choices, provide information, and decide among so many features that the time required for this process precludes “effective use” of the device within this navigational format. To avoid presenting the user with an overwhelming number of features and benefits, this navigational format relies heavily on programmed automation.

Strength: The strength of this format is that little or no training or technical knowledge is required. Although slow to use and difficult to modify in the field, this design is the best choice for one-time use by non-technical users in shared or public spaces (ATMs, for example). To maintain the simplistic nature of this navigation format it should be limited to information, small presentation or audioconference systems.

Option 1: The first option within this navigational format is designed for the least complex of AV systems. Simple Presentation. It is assumed that some environmental control may be provided with this system design but all



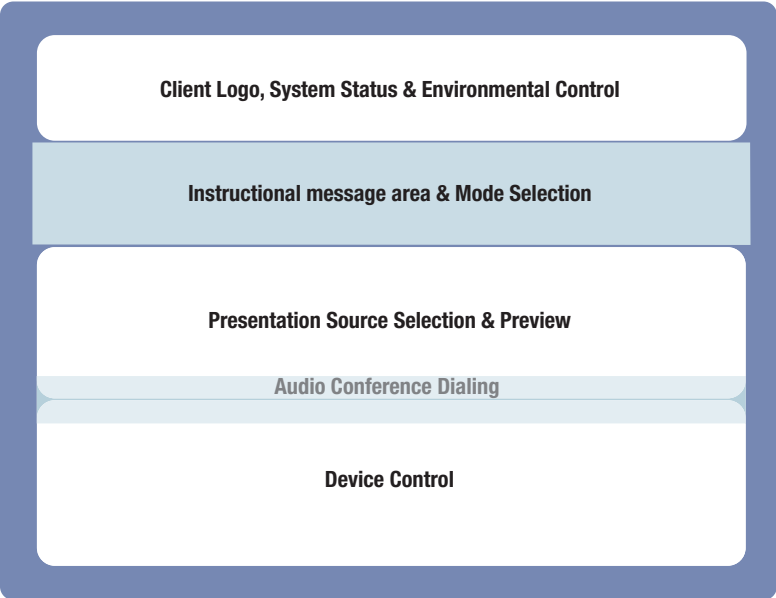
Option 1 sample screen



functions beyond source selection and perhaps volume are automated via programming. Volume controls are generally recommended in all system designs, even the most automated, because devices and media often vary in output signal strength. But in keeping with the simplicity of this design, functions are not provided to the user until needed. In this sample, the user is presented with only a choice between the audio and video hardware available and assumes the user is at least capable of loading media or connecting a device via an auxiliary input.

Due to the nature of AV control and the specifics of AV hardware, many devices are controlled by way of one-way infrared signals. Because a one-way controlled device can sometimes become out of sync with the control hardware, a back door to advanced or technical functions is recommended. This is often the only way to reset control systems and the devices contained within, short of rebooting the entire system. It is recommended that such advanced or technical features be password-protected to prevent access by inexperienced users.

Option 2: This option expands beyond simple presentation and can add functions related to environmental control and conference control. Conference control is best left to presets but could also include manual dialing and other common functions. It is important to keep functions limited for the benefit of the novice user, but additional functions may be added to this navigational format especially when they are common to technology in general. For example, it would be difficult to imagine someone in this day and age surviving without basic knowledge of the telephone, computer, and automated teller machine. For this reason, some knowledge of these devices can be assumed and similar functions within the control system are expected to be easily understood.



Option 2 sample screen

b. Progression Hierarchy (Menu Navigation)

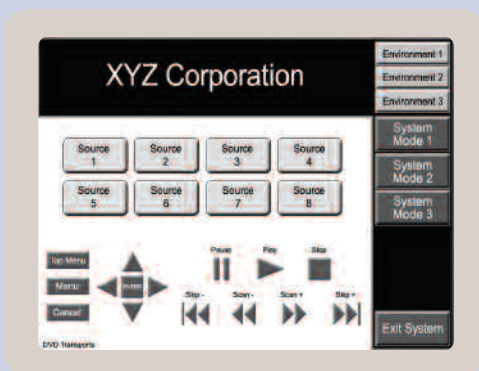
“Menu” Structure

This navigational structure employs a simple menu structure that presents all system functionality by mode or category using a progression hierarchy. Devices and functions are rarely more than one button-press away and this is a time-based interface that guides the user to the desired goal by omission barriers (features and functions are only presented when required). This system type allows for the use of organizational laws such as grouping by similarity or proximity, and creates a strong visual hierarchy by way of a figure-ground relationship.

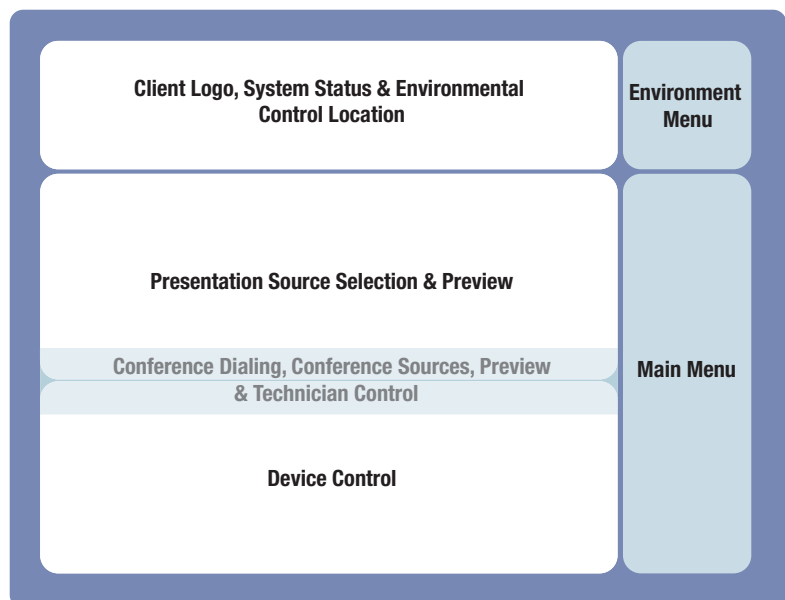
Strength: The menu navigational structure requires little or no training or previous AV knowledge, outside of an understanding of AV terminology. It is also easily modified in the field and will accommodate repeat use without frustration. Similar to the “Wizard” structure, this interface uses constraints that guide the user to the desired result; however, using the menu structure is generally much quicker than using the wizard structure.

Shown here are some variants (options) of the basic menu structure modified to accommodate system configuration features. The menu structure may be changed to accommodate right of left handed users and be top or bottom weighted based on system priorities. Furthermore, the most commonly used functions may be visible by default and may include a verbose set of instructions for the user.

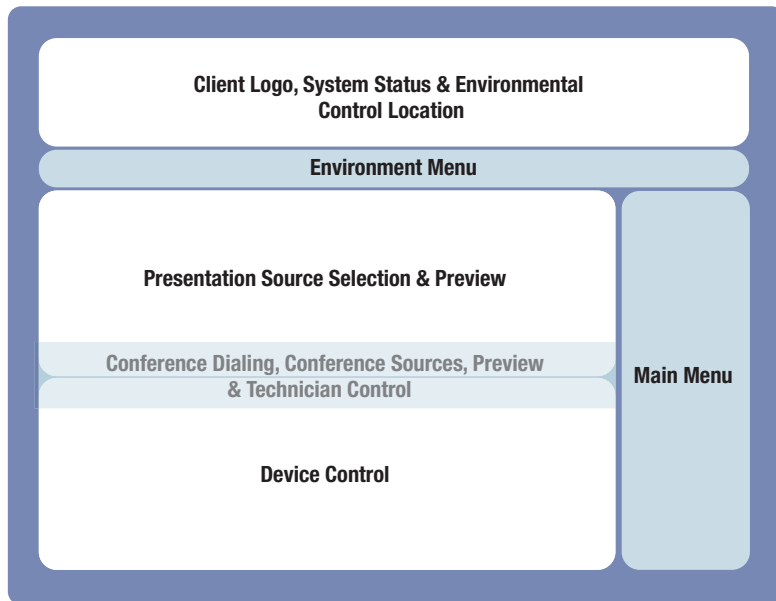
Option 1: These two samples outline right-handed designs that make use of a loose interpretation of the “Rule of Thirds” and place the environmental control across the top and the menu options down the right side. System status and client branding may also be placed across the top. Note: the examples shown are the second in the page sequence as use of an entry page for system startup is used.



Option1, sample screen 1



Sample 1



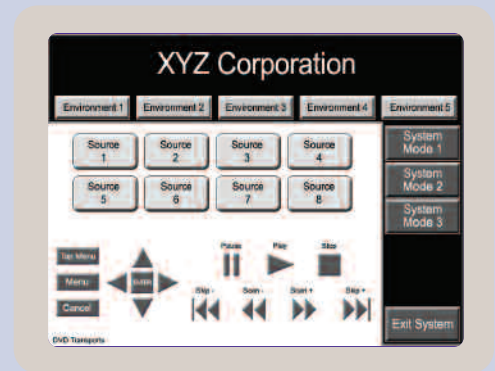
Sample 2

The menu structure provides a strong figure-ground relationship and designates between environmental and operational mode selections. This is done by creating a “figure,” or menu area across the top and/or side, and a “ground” area in the remainder of the screen real estate, where system features and functions reside. Flipping this navigational style along its vertical axis will accommodate left-handed users by left-justifying the main menu.

It is important to note that page justification should be based on specific knowledge of end-user needs. Providing a left-justified navigational style to a right-handed audience may force the user to reach across the screen to make main menu selections, resulting in the user’s arm blocking the bulk of the visible screen area. It is recommended that this be avoided, but the solution is dependent not only on the user’s comfort level, but also on how the system will be used. If the system is set up prior to use by the user or technical staff, fluid time-based navigation becomes less important. If the user is operating the system on the fly, fluid time-based tracking and visibility become much more important.

The menu section dedicated to environmental controls in this design will accommodate a total of three to four choices -- three by way of button selections and one default that is always visible if system demands dictate. Additional environmental controls require a slight modification in menu structure as outlined in Sample 2, but will maintain grouping by proximity in either case.

What is not shown in this illustration and is more difficult to communicate are the automated navigational elements that are based on mode tracking and custom programming. For example, this option may provide for three visible environmental choices but actually accommodates six or more. Volume, for instance, always provides the user with volume controls, but those controls may change based on what the user is doing. For presentation, the user may be given access to speech and program volume, but while conferencing the

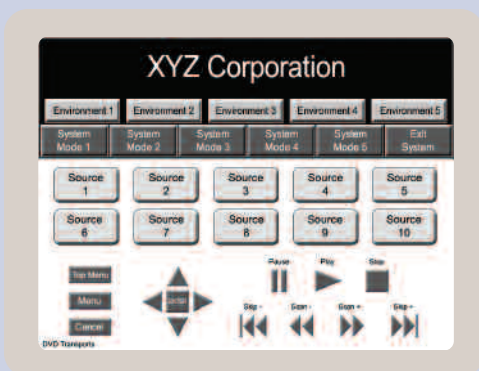


Option 1, sample screen 2

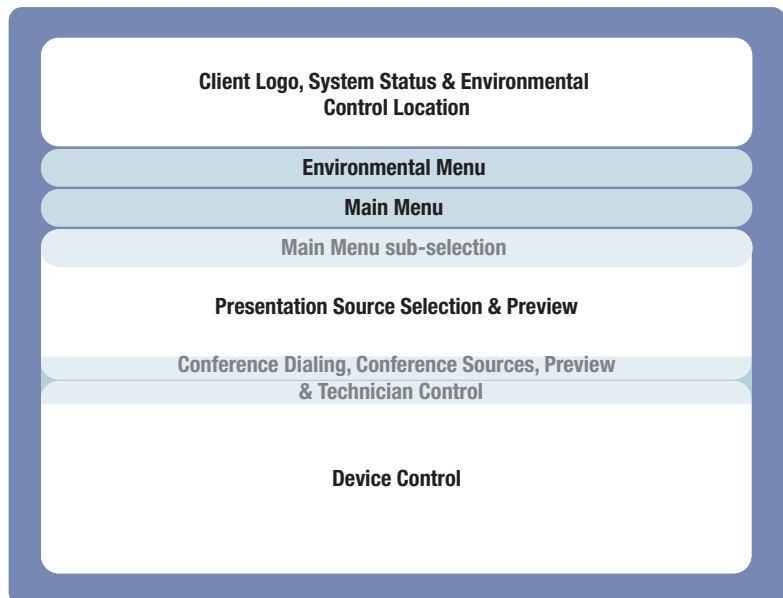
user may be provided with program and far-end volume control. In each case, the volume button is the required action but the functions contained are conditional. This approach of omission barriers (or providing only the functions needed based on system conditions and use) applies to all aspects of functionality.

Shown in Sample 2 is the right-handed version of this navigational style. The significant difference between this example and Sample 1 is the increased space provided for environmental controls. Again, environmental functions are grouped by similarity and proximity and are easily and simultaneously accessed regardless of what operational mode the user has engaged. Also shown in this example is the sub-menu variant of the side menu for Videoconference controls.

Within the side menu structure it is assumed that in each operational mode, sub-menu controls may be needed. In this example, Videoconference is the selected mode which displays the sub-menu options of Dialing, Sources, and Recording. Audioconference and Presentation may also have sub-menu options such as a breakdown of Presentation sources by category or Audioconference by dialing, presets, or setup functions. When selecting the main menu option --Videoconference in this example -- the functions presented should be those most commonly used. For example, when Videoconference is selected, not only will the sub-menu options appear to the user but Dialing may be the default functions also presented in the “ground” area of the interface.



Option 2, sample screen



Option 2: This option as shown in Sample 3 is the top-down version of the Progression Hierarchy (Menu) navigational style. It is based on the same principles as the others listed here.

This design specifically addresses the most robust system designs without converting to the Control Panel Navigational Style. The specific need for this

design is related to a robust system that is for intermittent or inexperienced users. Again, the use of omission barriers limits the number of choices available to the user at any given time, which makes the interface easier to scan but all standard features and functions are still provided in a mutually exclusive format.

The horizontal main menu structure in this version not only accommodates an increased number of environmental controls relative to Option 1, but also an increased number of main menu/sub-menu options relative to Samples 1 and 2. For example, each of the main menu options in this case may also require sub-menu options due to the robust nature of some system designs. Presentation may call for a sub-menu that categorizes sources by Audio, Video, Table, Auxiliary, Rack or Podium Sources, etc. Videoconferencing may require a sub-menu that categorizes sources such as Dialing, Menu, Presets, Recording, Setup, Camera Control and Sources, among others. Each of the main menu options may support a robust number of sub-menu options provided in a pop-up or sub-page that may also time-out to economize on space.

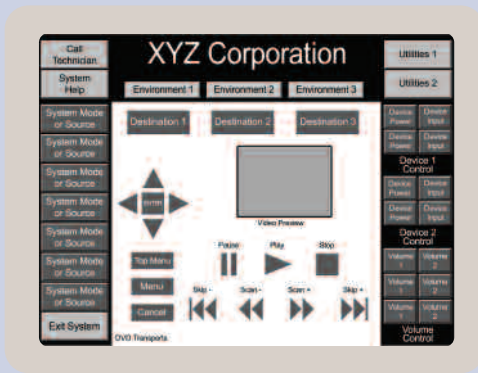
Note: Sub-menus are a function of programming sub-pages or pop-up pages. It is possible and sometimes recommended that these pages time-out when not in use. Environmental controls, for example, can be programmed to time-out following three to five seconds of inactivity. Technical or high-frequency users may be provided the option of the Control Panel navigation format for quicker access of all system features and functions.

c. Control Panel (Global Navigation)

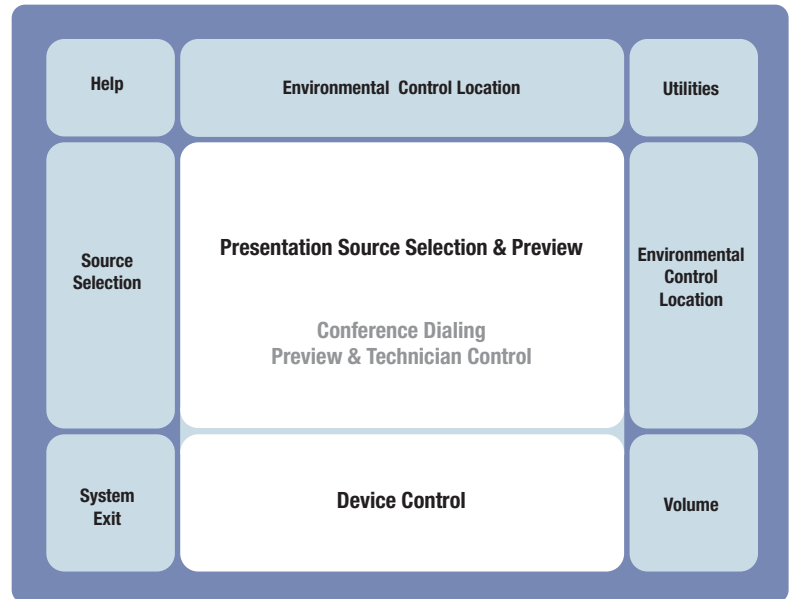
“Global” Structure

This interface presents the user with the bulk of system functionality on a single main page where all functions are present or one button press away. Designed for the repeat, or technical user, this interface style may intimidate the novice user because of the many options simultaneously presented. The global navigation format organizes like functions in specific areas of the screen, giving some commonality from system to system regardless of content. Its apparent complexity may require that initial training by industry professionals be provided to some users.

Strength: This is the most acceptable navigation format that will satisfy advanced technical users who depend repeatedly on speedy access or for moderate- to high-frequency repeat uses such as in a university environment. Both the global and wizard navigation formats depend on the user reading what can sometimes be a large quantity of text prior to deciding a course of action. For this reason structural or graphic design elements should be used to guide the user to the most commonly used functions. This is achieved by appropriate positioning, grouping, or color selection to draw attention to the most frequently used features or functions. Two alternative global formats are shown; both rely on top-down methodology.

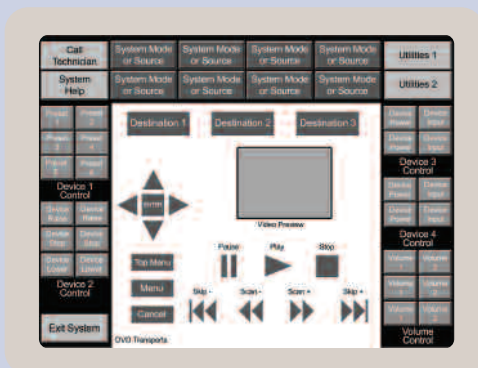


Option 1, sample screen

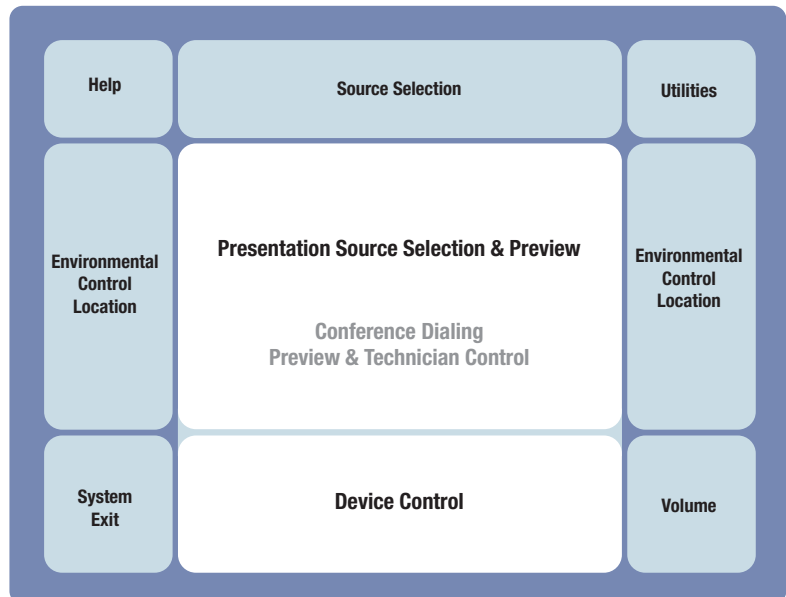


Option 1: This left-justified format follows the basic understanding that Western English-oriented individuals read left to right when presented with large quantities of visual information. The conceptual model for this format is most common in digital information presentation such as text-based web sites. This format may be flipped along its horizontal axis for a non-English-speaking audience requiring left justification but the top-down sequence should remain consistent with system priorities. This format also presents or makes available advanced or technical functions that would be hidden or automated for the novice user. Whenever possible, as touchpanel real estate provides, the most commonly used functions should be presented simultaneously within an operational mode for fast access.

Option 2: This navigation format follows a top-down layout. In both options presented, items that are likely to be the first (and impacting other, remaining



Option 2, sample screen



choices) for AV operation are giving highest priority relative to the top left corner. This option places emphasis on source selection as the primary choice. While the user and primary use per user cannot be assumed, this format is designed for a high-frequency shared space. In that respect, most users encounter the system already running and, in at least some cases, may go directly to a presentation, for example, with limited or no need to make environmental or setup modifications.

4. Panel Size: Small/Medium/Large

In reference to panel size, a simple calculation may be applied to determine usability based on the average size of the pointing device (the finger) the available panel real estate, and the number of buttons required based on non-overlapping functionality (i.e., per functional mode). In general, as panel size decreases and system intensity increases, usability decreases. A general rule of thumb is that smaller (5" or smaller) touchpanels are appropriate for Presentation Only systems unless external navigation options exist. However, even with external navigation, the system complexity may preclude ease-of-use for the novice.

Interface and System Design Glossary

Within each system type and interface style outlined in this document, distinctions have been made for operational modes, system features, and device dependent functions. This section outlines the basic differences between modes, features, categories, and the menu structures used to create interface design hierarchies. It is designed to establish a common descriptive vocabulary related to audiovisual systems. Because the design of many controls is customized, the categories listed below may not be present in every control system one may encounter.

Operational Modes

Definition: Modes can be described as the core functional purpose of an audiovisual control system design.

Operational modes include presentation, audioconference, videoconference, recording, environmental control, and advanced or technical functions. In most cases, modes can be considered mutually exclusive. For example, the user will not need to view technician control simultaneously with videoconference dialing. How these modes are segregated and visually presented to the user varies based upon the system configuration and navigational format provided.

In some cases it may not be necessary to distinguish between operational modes because the end-user may be completely restricted to a minimal number of system functions. In the case of a presentation system, the user may be restricted to a select set of video sources and all other functions related to switching or environmental control may be handled remotely or may be fully automated. Access to technical or advanced controls in this case is restricted to the technician or advanced user and will be transparent to the end-user.

Menu

Definition: A structured textual and/or graphical list that represents functional choices.

By establishing a simple menu structure, operational modes are compartmentalized, thus omitting functions unrelated to the task at hand. The menu structure presents a clean, less confusing interface; fewer options make the interface easier to read and control. A menu structure may be very

detailed, as in the case of a robust presentation system containing video, audio, computer, rack, booth, and/or auxiliary sources, or very simple, containing just two or three options. In both the control panel and progression hierarchy navigation formats, a menu structure may be used to control the user's operation of the system and be the first hierarchical level presented to the user.

Sources

Definition: Any device that outputs information by way of an audible or visual means generated internally or based on replaceable media.

Video, audio, computer, local, and auxiliary are just a few of the distinctions made to provide descriptive names for devices related to information presentation. Sources are typically provided in both presentation and videoconference modes; however, the features provided in each mode may not be a direct duplication.

Destinations

Definition: Audio and/or video device or, less frequently, the conduit used to display information.

Typically related to visual display devices, destinations may include projectors, plasmas, monitors, far end for videoconferencing, and preview for touchpanels with embedded video and RGB signal support. Destination routing is typically grouped and related to sources and often includes a text field to indicate which device is routed to a particular destination. Additionally, the setup features of display devices may include power and input selection and can be grouped with environmental controls, as they affect physical room conditions.

Environment

Definition: Functions that typically relate to physical comfort or physical properties of the area being controlled.

Environmental functions typically include volume, lighting, shades, drapes and HVAC (heating, ventilation and air conditioning), if present. These functions can be described as related to the physical comfort of the environment; a further distinction may also be made regarding environmental control, as it also relates to control of a room's physical properties. In this respect, environmental control also includes display devices, screens, projector lifts, room partitions, etc.

Input Entry

Definition: End-user-controlled text or numeric character entry by way of a simulated or hard wired keyboard or keypad.

Typically, in commercial systems, input entry is limited to preset management and keypad entry for dialing and password entry or modification. For some conference hardware, it may also be necessary to provide a complete keyboard for preset naming. Keypads vary based on hardware, but most commonly include numeric channel selection or dialing functions.

Transports

Definition: Also referred to as shuttle controls, transports are device related functions for the display of an audio or visual signal or media control.

Transports are functions and features generally related to information presentation. An important distinction is that input select or aspect ratio for a display device, for example, are functions related to setup, whereas play, stop, pause, and other transport functions control media or the display of a digital signal. For that reason, the power or setup functions of a display device are usually found in environmental control, while the same functions of an output device are found in transports.

Presets

Definition: The ability of the system to execute one or multiple predetermined tasks with the push of one button by the user.

In complex systems requiring numerous camera positions, phone numbers or television stations to perform the required task, static or active presets may be provided as shortcuts. In most cases the static preset is generically labeled and may be reset by a press-and-hold action. Active presets allow for creative modification by the user whereby the button text, graphic, and even location may be modified. In both cases, presets can be used to minimize the number of actions required to perform simple tasks.

Preview

Definition: On-interface source signal in the form of an RGB, video, or computer input for cueing or monitoring and full screen viewing.

Many wired or two-way touchpanels provide the option to display video and/or RGB signals locally. In system designs that require cueing or monitoring tasks, video or RGB preview windows are displayed when presentation or videoconference is the selected operational mode or, in the case of a presentation system, when a specific source has been selected. When video and RGB signals are supported locally, the programmer also has the option to use the touchpanel as a display device with or without minimizing control related functions.

Entry Point

Definition: The initial point of end-user contact with the control system which is generally used to begin various system functions.

The importance of the entry point is two-fold: practical and aesthetic. First, it provides the user with a clear indication as to the system status and actions required to proceed and start the system. If designed well, the entry point can also be used to create a positive first impression with the user, which can influence the user's comfort level with control technology. Secondly, the entry point provides the programmer with more than one signal path to initiate several automated processes related to system boot and status tracking. In some system designs, an entry point shortcut is provided to a single source, i.e., "view local PC," allowing inexperienced users a quick path to use.

Warnings

Definition: Any message or indication given by the system to indicate the status of various functions and aspects of the system, most common when an error state is encountered.

The general concept behind warnings and messages is to make the user comfortable with the operation of a control system by effective communication. In many cases, especially for infrared controlled devices, the programmer has no way to poll equipment for status. In such cases, the user will benefit most from advanced training. For systems that are truly integrated, device polling, room monitoring, and user messages should be used to identify problems and communicate to the user any error condition or the potential of a problem. Ultimately, the benefit to communicating system status to the end-user, especially in an error state, is to indicate whether a problem is the result of a preventable user action or rather is a hardware anomaly.

Exit Point

Definition: A point within the control system that allows for the easy initiation of shut-down procedures.

System shutdown procedures vary based on the system design, hardware selection, and environmental requirements. The most common concern in a shared commercial or educational space relates to the trade-off between the desire to preserve projector bulb life and the desire to have the system fully prepared for use at any time. Furthermore, other concerns related to environmental controls affect room preparedness upon system shutdown. Examples beyond the need for projector warming and cooling requirements include HVAC, lighting, network connectivity and security. These examples display the need for maintaining a tempered open environment with sufficient lighting for safety purposes, while shutting down core system elements, or at least locking out all network access and technical control from the interface.

Advanced Controls

Definition: For the purpose of this document, advanced controls refer to the level of functions reserved for technical users.

These functions do not require frequent access but rather modification only when there is a change in a component of the system, the system design, the environment or a user. Typical to this category are auto-shutdown and startup, password modification, time and date setting, and camera preset management. Additionally, functions within the setup menu of the touchpanel can fall into this category if the technician has been trained to perform such tasks or has direct support from an engineer or the manufacturer. These include IP address, sub-net, gateway, WEP, and additional panel functions related to brightness and contrast, etc. Typically, access to these functions are hidden to the user and/or password protected.

Conclusion

The information presented in this document, along the Dashboard for Controls Design Guide and the Design Reference, has been compiled to provide the interface designer with general information and interface design guidelines. All the information presented is based on Human Factors research into a variety of technologically interactive mediums that apply to the control interface in a variety of ways. This document was not designed to outline standards, but rather to educate the interface designer and provide insight into the human condition and the needs of the user we seek to satisfy.

Interface designers are advised to recognize that they are not designing for their personal use. The end-user does not care how creative the system design may be, what gear is involved, how well the cables are dressed or if the wiring is certified. The end-user has a job to do that requires the easy use of an audiovisual system controlled from one central point: the touchpanel. If the control system interface is small, overcrowded, hard to understand or needlessly complex, the system as a whole fails to achieve its most important goal, ease-of-use.

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