Goal Driven Control System Design

Enhancing the user experience by reducing control system complexity

By Derek Joncas

AV designers, developers, and engineers are, by nature, innovators. This penchant for innovation is part of what drives them to bring the latest technology to bear, and to leverage that technology so their clients have the highest quality user experience when interacting with their systems. Developers like to promote each new system as ‘custom’ or, at the very least, a new spin on an old design. We set the expectation with our client that their new system will be unique.

And in many respects it is.

It’s tempting to let new technology drive the system design. As manufacturers add more and more functionality into their products, developers are lured by the challenge to design a system that can control every function. But too much emphasis on innovation can result in overly complex systems that are difficult to use.

A developer’s comfort level with technology is higher than the average corporate executive or university professor. As a result, developers can end up designing a control system that completely baffles the user. Complexity can also increase when the developer uses himself as a model user. This is an all too common practice when schedules are tight. Rather than interviewing and observing actual end users to truly understand their needs, developers sometimes place themselves into the scene and ask, “How would I use this system?” or “What functionality would I want?”

It’s not that the developer’s viewpoint and technical knowledge are unimportant. After all, developers must have a thorough knowledge of the capabilities of the system. The ultimate goal, however, is not a control system that fully exploits those capabilities. It’s to create a system that will meet the user’s needs, and that the user will actually find useful. When usability is the ultimate goal, the combination of technical knowledge and a developer’s mindset can produce astounding results.

Putting Users First

It’s interesting how my experience writing this article parallels that of many AV control system users. I am using a PC with the latest Intel processor, docked to dual 1920×1080 LCD monitors. I’m using Microsoft Word 2007, which has more features and capabilities than I could ever learn in a year of classes. But what am I trying to do? I am typing a simple document that someone else will format, pretty much as I did with the first computer I bought over 20 years ago. Over those two decades, I could count on two hands the times that I have done a mail merge or used more than a couple of different fonts. But I do depend on several key features, like spell check and grammar check, and the ability to add bold or underline text for emphasis.

I understand why mass-marketed software applications need to be loaded with features, but for my purposes, this article creation system is much more complex than it needs to be. The simplest word processing program and a small monitor would suffice. The AV world is very similar. So many times, we design for “edge scenarios”, contingency planning for every possible situation we can envision. We design the system capabilities and the user interfaces around the “What if the client wants to …” scenarios rather than focusing our attention on the “What does the client regularly do …” scenarios.

Designing better control systems relies on answering two key questions. These will more clearly define what the control system needs to do, and how to simplify the control system’s overall capabilities, thereby increasing the usability of the system and giving the user a better experience.

The first question is: “How does the end user regularly use the system?” This is where the old 80/20 rule comes into play. Eighty percent of the time we only use 20% of the system capabilities. Define what your client does 80% of the time.

Secondly, it’s important to ask, “What are the critical functions that rarely occur, but must function flawlessly?” These features are considered “edge scenarios”, but because of their critical nature need to be present in the system with rock-solid functionality. A good example of a critical but rarely-used function is tying the system’s audio mute into the Fire Alarm system. You hope this life safety system is never needed and, for most customers, it never
will be; but when it is needed, it must operate flawlessly.

Too often we see specifications for control systems that state, “The control system shall control all controllable audio and video equipment and must provide control for all functions available.” Is that realistic? Is it necessary? Does it serve the end user’s best interests?

**Create User Personas**

Alan Cooper, widely recognized as the “Father of Visual Basic”, is well-known for his role in humanizing technology. In his 1998 book, “The Inmates Are Running the Asylum”, Cooper discusses the development of “personas” that represent the users of a product or a piece of software. The personas are accurate representations of the users of the product, but are not tied to specific individuals. Cooper identifies the goals of each of the personas and uses the goals to sharpen the focus of what the product needs to ultimately do.

By using these developed personas, Cooper contends that you can remove the individual preferences and pet features to drill down and determine how the product needs to optimally function for its intended user.

How many times have we seen AV projects driven by a single individual at an organization and how he or she would like to see a system operate? How many of those folks are still there? Over time, there’s a strong likelihood that the individual has been promoted or has left the organization for one reason or another, with the system abandoned because it’s too complex for the next person to operate.

**Clearly Define Goals**

The traditional approach to control system design focuses almost exclusively on the individual desires of a few key players. By using Cooper’s techniques and developing user personas to identify the common goals for the system, we can clarify the intent of a customized control system.

Defining goals also allows us to simplify the system. Cooper says that whatever your interface is, it would be better if there were less of it. Less can mean much more than just the number of pages or buttons. Think about the recently-discontinued Flip video camera. Flip’s designers looked at typical consumer camcorders, who used them, and how they were used. They quickly realized that most functions weren’t being used, and that a significant customer base was intimidated by even how to start the camera to record video. In developing their user persona, the Flip’s designers set the standard for developing an easy to understand user interface. In an AV control system, users should naturally perceive how to operate the most commonly used functions, such as power on and off, source select, play, pause, and stop.

As AV professionals, we can become so comfortable interacting with new technology that we get defensive about our system designs. We might find ourselves brushing away complaints about a confusing interface by saying things like, “Well, yes, but if you just hold down this key and click on this, then it all works together … See?”

We need to remember that our customers often view new technology as threat to the way they’ve always done things and may not be all that eager to change the way they work. How many times have you visited a client only to hear that they have other AV systems, with and without control systems, which are going unused because of usability or maintenance issues? By understanding the goals of all of the participants, we can add value to the whole AV system that creates a positive experience for everyone, and leads to better relationships and future business.

**Let the Goals Dictate Innovation**

Another aspect of system design that dramatically affects the direction the design takes is the level of innovation that is required by the project. Is the project highly conceptual and groundbreaking, or is it an adaptation or revision to an existing design? Or does the project fall somewhere in middle? The ways in which we approach each of these project types may be completely different. Different expectations are set within the development team and with the client. Perhaps even different resources are allocated or different people are selected for the job. Knowing the level of innovation that the members of your team bring to the table helps you identify the right people for the job.

By their nature, most creative people will strive to be innovative in their approach to any problem. This is fine if the job requires it, but if you are designing four or forty classrooms all with similar utilization criteria, do you seek to find a unified design or do you set out to design separate, unique systems? You may say, “A single unified design, of course.” So, why not use the same approach the next time you need to design a conference room?

The level of innovation must fit the goals expressed by actual users. Think about the age-old “form follows function” principle of design. The principle is that the shape of a building or object should be primarily based upon its intended function or purpose. Successful designs, like that of the Airstream trailer, for instance, follow this principle, while those that miss the mark, such as the DeLorean sports car, age rapidly and are quickly abandoned.

If we bill and market our services as “customized” rather than “custom”, we can ever so subtly change the perception of what we do. We can use tried and true modules and methods rather than continually creating new processes and new designs. Often the art is not in the innovation as much as it is the application of experience.
Introducing Global Configurator Professional Software for Advanced Configuration

Even in applications that are perfectly suited for a configuration solution, system designers can sometimes encounter situations that challenge its capabilities. Since the introduction of Global Configurator, there have been power users pushing the limits of configuration to get it to do more than it was originally designed to do. This year Extron is introducing a new configuration application that will combine the benefits of configuration with some of the flexibility of programmable systems.

Global Configurator Professional is the next generation configuration software for larger, more sophisticated TouchLink-based configurable control systems. It provides an integrated environment for defining advanced AV control system functionality from an easy-to-use graphical user interface. This new evolution in configurable control is so advanced that mastering it will require the mindset and skills of a developer.

Global Configurator Professional includes a new feature set that provides enhanced flexibility when configuring advanced systems.

Conditional logic with Variables
- Enables advanced functionality using “if” and “else” statements
- Allows examination of conditions within a button action before performing a task
- Helps in streamlining project creation by minimizing the need for monitors and schedules

Control Groups
- Allow control processors to be grouped together to work as one large controller.
- Benefits advanced systems that require additional control ports
- Reduces the need for long RS-232 cable runs since a control group can span several rooms
- Provides an opportunity for easy expansion of existing systems

Controller Templates
- Creates an abstract representation of a controller
- Enables creation of a reusable baseline configuration
- Changes made to a template are automatically duplicated to all linked controllers

TouchLink for iPad and TouchLink for Web
- TouchLink for Web is accessible from any Web browser that supports Microsoft Silverlight
- TouchLink for iPad is an AV control system App designed for the Apple iPad
- Both versions support Button Tracking, keeping virtual and installed touchpanels to stay in sync

Consider a Configurable Approach
Programmed control systems offer a great amount of flexibility in creating a fully custom AV system that can be tailored to exactly fit the unique needs of an individual client. This has traditionally led developers to prefer a programmed approach for large AV systems. However, the new advanced configuration tool from Extron, Global Configurator Professional, Extron’s, moves the boundary lines a little further.

GC Pro significantly expands the types and complexities of AV systems that can be controlled using a configurable approach. Powerful new features, including conditional logic, combine the best of both programming and configuration. GC Pro was designed specifically to support more complex systems and leverage the skills of a developer. Also, Global Configurator Professional will be licensed only to individuals who have achieved Extron Control Specialist certification. For more details on certification and GC Pro licensing, contact an Extron Support Representative.

Configurable control systems offer a wide range of benefits. They save time, particularly for large installations with many similar rooms. Consistency of the interface reduces the time required to educate users on system operation. Control system changes take less time with configured systems which results in lower costs for the end user. Configured systems also provide a high level of system ownership & independence to end users, avoiding the question of "who owns the code".

The Ultimate Goal
Our ultimate goal, as AV systems designers, developers and engineers, must be the complete satisfaction of the people who use our systems. This is the value in what we, as AV professionals, do for a living, and the return on investment that our clients are looking for. We are constantly called on to walk a tightrope between current and emerging technologies, and making technology accessible to our clients. Control systems are the bridge that makes tomorrow’s technologies accessible to our clients today, but the consideration of our client’s goals must always be at the center of everything that we do. AVSD

Derek Joncas is Manager of Product Marketing at Extron Electronics for control systems hardware and software. He has worked in the AV industry since 1998, holding senior engineering and management positions with companies focused on AV integration, managed services, broadcast, broadband data services and software development.