Performance. Reliability. Security.

Guidelines for government AV specialists designing high-performing, secure, and reliable display solutions

CHKISTIE®

Expand your digital potential

You need high-quality display and processing products for secure and reliable data visualization. As a government AV specialist, you want to build a flexible and scalable portfolio of innovative and future-proofed AV technologies—from projection, LCD panels, and LED video walls, to content management and processing solutions—to effectively meet your digital display needs for all sizes of audiences, applications, and venues. You need support from initial design and procurement through installation followed by ongoing professional services and support.

In this white paper we review current display technologies and offer guidelines to help you design high-performing, captivating digital experiences that drive high rates of return on investment (ROI).

AV solutions provider checklist

Besides offering a wide range of high-performing display and processing products to suit even the most demanding government applications, this checklist helps confirm you've found the right AV solutions provider:

› Are they familiar with serving and supporting all levels of government?

› Do they have expertise fulfilling government contracts?

› Can they offer a simple and seamless process from concept, design, and installation to services and support?

› Can they support you as a single-vendor supplier of secure and reliable AV solutions?

› Do they back up their products with industry-leading customer care, technical support, comprehensive warranties, and global professional services?

Whether you're outfitting a single training room or tackling a base-wide technology rollout, start by establishing your vendor requirements.

Different venues require different display sizes and types

When choosing AV solutions, you'll want to consider the size of your audience, their viewing distance, and the type of content you want to display. Consider every viewer's experience and choose technology that offers maximum participation and engagement. For instance, for text-heavy presentations, you need to consider the furthest and most off-axis seat in the venue.

The right light

Examining your choices through the lens of the audience or operator will help you determine whether you choose an LCD panel, projector, or video wall solution. For example, for medium-sized audiences, projection that offers up to 8,000 lumens or discrete LCD panels are the best fit. Scale up to an auditorium or any larger space for hundreds of people, and you may want to consider a bright, seamless tiled LCD video wall, LED video wall, or a higher-brightness large-venue projector from 10,000-30,000 lumens—depending on the ambient light in your space.

Creative options

If your auditorium is wider than it is deep you might consider designing a wide video wall solution for clear off-axis viewing. You can configure video wall displays into unique shapes to create a striking image or an artfully constructed architectural component. Video becomes more powerful with LED video walls, arrays of LCD panels, or large-scale immersive and/or 3D projection.

The link between audience experience and resolution

The resolution you need depends on your application, venue size, and audience viewing demands—from high-definition (HD) to 4K ultra high-definition (UHD) resolution and beyond.

Although 4K is now mainstream, HD and WUXGA resolutions are still practical options. Consider your audience: 4K UHD displays 4 times as much visual information as HD. For video, HD is often enough. However, for teams that display complex research data, 4K UHD produces more detailed content and is a far more impactful display format. If the front row seats in

your auditorium or training space are close to your larger screen, your audience could see a pixelated image when they view HD content; 4K UHD resolution eliminates that issue. As the development and availability of 4K content demand for 4K UHD display technologies increases. Investing projection in 4K technology today futureproofs your investment.

Projection technologies explained

Laser illumination

Laser illumination—also referred to as solid-state—has effectively replaced lamps as the preferred projection light source. Laser offers many benefits over lamps, from incredible color reproduction and high efficiency to low maintenance (no lamps to change) and instant on/off. Laser also offers an incredibly long life: they're commonly rated for 20,000 hours to 50% brightness for laser phosphor or 30,000 hours to 80% brightness for RGB laser.

Let's look at the 2 types of laser illumination: laser phosphor and RGB laser.

Laser phosphor

Laser phosphor projectors, which typically range from 3,000-30,000 lumens of brightness, meet the needs of almost every boardroom or training room application and fit within most budgets. Laser phosphor typically uses a blue laser and a phosphor wheel to reproduce color in the Rec. 709 color space, and some manufacturers introduce red laser light to produce more lifelike colors.

RGB laser

RGB pure laser diodes beam red, green, and blue laser light, creating the most dynamic color reproduction, and the richest, highest contrast displays to reproduce color in the Rec. 2020 color space. RGB illumination packs a punch, with brightness levels of 30,000-50,000 lumens for large-venue applications. As technology advances and the cost of ownership improves, RGB pure laser is poised for increased use.

From laser light to projected image

Once lasers create light, that light must be manipulated to create the image we see on screen. Let's look at two technologies that do this: LCD (liquid crystal display) and DLP® (Digital Light Processing).

LCD projection

Laser phosphor projectors use either LCD or DLP technology to generate images. With LCD, laser light shines through a layer of liquid crystal, so it's commonly labeled as 'transmissive.' The advancement of LCD technology results in an affordable and reliable standard for any government use.

DLP projection

Both laser phosphor and RGB pure laser projectors can use DLP® technology to create images. Laser light reflects off microscopic mirrored panels called Digital Micro-Mirror Devices (DMDs), so this technology is 'reflective'. Each DMD consists of millions of tiny mirrors that each act as a single pixel in the resolution of the projected image.

DLP consistently offers greater light efficiency and color control than any other projection technology. Individually controlled pixels result in a smoother, cleaner image. And since all light reflects out of the projector, DLP offers higher brightness from smaller units and uses less power.

Curious about your projection needs?
Try our online projector lens calculator.

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Direct-view technologies explained

There are 2 primary direct-view technologies used today in government environments: LCD and LED. Let's look at both, then compare these technologies based on a variety of common requirements.

LCD panel technology

An LCD (liquid-crystal display) panel uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals don't emit light directly; a backlight or reflector produces images. Discrete LCD panels range in sizes up to 98". Or you can use tiled LCD panels, typically 55" in size, to create video walls. With bezel sizes of less than 1mm available, seams are almost imperceptible to the viewer.

Curious about using LCD in your space?
Try our online LCD configurator.

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LED technology

LED video walls offer a truly seamless option that look great in most environments, including those with high ambient light. LEDs (Light Emitting Diodes) are based on the phenomena of electroluminescence. An LED video wall typically uses individual standard LEDs that each receive their own drive signal based on video content, which generates millions of colors. Typically, each tile is composed of a series of identical LED modules. Their structure means you can hang LED tiles from an external frame and build large arrays of many tiles. No bezel means LED video walls display a seamless composite image that contains anywhere from several thousand to millions of pixels, depending on the number of tiles and pixels each contains. You can scale LED walls to almost any size and arrange in near-limitless ways, including 90-degree inside or outside corners, concave or convex curves, and even 3-dimensional shapes.

Want to see how you can use LED in your space? Try our online LED designer.

Try here

Content management and processing explained

Get the most out of your display technology with powerful content management and processing technologies that do the heavy lifting so you don't have to—for complete, integrated solutions. The right AV vendor will offer an extensive range of image processors, video wall controllers, and projection software solutions, making it easy to design customized, integrated video wall systems for your command and control centers, briefing and board rooms, and tactical operation centers.

You can use multi-screen windowing processor technology to create spectacular visual experiences, and industry-leading technology will provide 80 megapixel, true 4K/60Hz on multiple displays.

For uncompressed, zero-frame latency, and artifact-free content, the right SDVoE technology solution will allow you to transmit 4K@60Hz audiovisual content over 10G networks. A complete solution will include transmitters, receivers, processing and control.

For your control rooms, you need seamless access and control of your AV data from virtually anywhere through a single, robust system. A solid system includes a hardware node that is

powered by web-based management software to enable users to get the information they need to make fast, accurate decisions with confidence.

For real-time video processing and show control, consider 64-bit software you can use for live events, projection mapping, and image compositing.

Additional considerations

Projection software solutions

For projection mapping, consider automatic, camera-based alignment software you can use to align and blend multi-projector systems in minutes, eliminating the need for costly screen or object markers. Real-time auto-alignment projection software is also available that can realign blended displays with pixel-perfect accuracy, even while content is playing.

Brightness

Brightness requirements for video walls vary depending on your application, with LED offering the brightest option. You may need higher brightness improve contrast in environments where ambient light is very high, such as rooms with walls of windows. However, in applications like control rooms, too much brightness may be a downside if people work in front of the video wall for a full shift. Too bright, and staff may suffer headaches or eye strain over time. Not bright enough and contrast may be too low, making it difficult to quickly and accurately discern information.

Contrast

Contrast is defined as a ratio, calculated as the difference in luminance between the blackest black and brightest white that your visual technology can display. The higher the contrast ratio, the greater the difference between the darkest and lightest aspects of your on-screen images. For example, a 10,000:1 contrast ratio means the lightest white in your image is 10,000 times brighter than the darkest black. Not only does higher contrast result in incredible images, it provides more visual information, making it easier to view detail, especially in darker colors. If you have dark or detailed content to display, higher contrast is ideal.

It's also important to consider the ambient light within your space, because any amount can negatively affect contrast ratio. If your briefing room or command center receives light through uncovered or hallway windows, the light can 'wash out' the image on your screen. Even the color of the walls, floor and ceiling can make a difference, since light colored walls can reflect light back onto your projected image. Anything you can do to reduce the ambient light in your space—from turning off room lighting, closing the door, and using window coverings to using projection screens designed to counteract ambient light instead of projecting on a wall or chalkboard—can help preserve contrast quality.

Seamlessness

Seamless displays ensure viewers don't notice transitions from one display unit to the next. Although not 100% possible, LCD panels minimize this transition by offering bezels of less than 1mm. For large video walls where operators and users are typically 10" (3m) away, the gap, in combination with the bezel, is considered negligible.

In contrast, LED tiles achieve seamlessness and are designed to touch each other without increasing the distance between the pixels from one tile to the next. The area that surrounds LEDs in a typical tiled array makes it difficult to see individual tiles from a normal viewing distance. And advanced software capabilities that offer automatic seam correction further enhance seamless image quality.

Image quality

New displays are brilliant, but can they maintain that same level of performance over time? If image-performance factors such as color, brightness uniformity and imaging quality aren't the highest priorities for your application, then LCD panels may be your most cost-effective solution, especially if your application doesn't require 24/7 operation. However, if image quality is critical for 5+ years, LED displays are your best choice. Best-in-class LED walls offer advanced capabilities that optimize your content and automatically maintain uniform color, and brightness over its lifetime.

Viewing distance

Optimal viewing distance is the point where the viewer no longer sees individual pixels. For LED, you can determine optimal viewing distance by multiplying the pixel pitch (mm) by 8. For a pitch of 1.25mm, the optimal viewing distance is 10 feet (1.25 x 8). Today's state-of-the-art tiled LCD solutions can achieve a pixel pitch as small as 0.37mm, making close-up viewing possible and viewing distance a non-issue.

Projectors offer a variety of lens options to accommodate various room sizes and throw distance needs. You can mount ultra short throw (UST) lenses very close to the screen surface from the ceiling or place on a table, reducing the space requirements and eliminating shadows from presenters walking in front of the screen. Other optional lenses allow for screen sizes of 300-500", however this depends on the lumen output and ambient light control of the room.

Footprint and ease of deployment

If space is limited, then the physical depth of your solution may be a key deciding factor. Most LCD panels and LED tiles are less than 4" (100mm) deep and can be installed with only 4-8" of space from front-to-back, including the mount. With their minimal profile depth and smart design, LCD panels and LED tiles also offer ease of installation. LED tiles offer creative freedom since you can mount them along a curve or create displays of any size or shape. Best-in-class LCD and LED walls are sold with direct-mount systems that allow them to be installed on flat walls without third-party solutions, saving costs, and reducing installation complexity.

Projection allows for endless flexibility, since omnidirectional installation creates possibilities for non-disruptive placements. Digital remotes and image adjustments make for quick setup and use.

Adhering to barrier-free guidelines

To ensure your display complies with your country's guidelines for safer, accessible, barrier-free spaces and follows the principles of universal design, you'll want to select a low-profile and narrow-depth display solution. In North America, displays can extend no more than 4" (100mm) from the wall to be considered barrier-free according to the Americans with Disabilities Act (ADA) and Canadian Standards Association (CSA). LCD panels and LED tiles both fit well within spaces that have specific requirements to comply with these or similar guidelines.

Projection technology also achieves this with a variety of lenses that create distances, screen sizes and viewing experiences based on specific requirements. Combined with a UST lens, you can create a clean and seamless presentation area with no obstruction to seating and achieve large-scale, high-impact visuals in small spaces while retaining high-brightness for all resolutions.

Initial and total cost of ownership

A big benefit of LCD panels and some projectors is their low initial price. For a given display surface area, LCD panels can be a fraction of the initial cost of an equivalent LED-based system. Although operational lifetime is lower and there are other performance compromises, LCD panels and projection can be the right solution for applications with tight budgets.

Lifetime

LED tiles in a 24/7 control room enjoy a useful life of around 11 years, while the typical lifetime of an LCD wall is 5-7 years. Most laser projectors perform for 20,000 hours to 50% brightness and are designed for high reliability, very low maintenance, and minimal performance degradation over time. LCD panels and laser phosphor projectors are more affordable than LED tiles and premium, performance-based RGB pure laser projectors, but trade-off on longevity, image quality, color performance, and contrast.

Availability and reliability

Best-in-class LED and LCD video walls and projection deliver high-reliability with high-quality components and system redundancy. While it's possible to reduce your initial investment using suppliers with lower-quality components and limited service capabilities, such short-term solutions often increase your risk. Industry-leading customer and technical support and comprehensive warranties are good indications that solutions are high-quality and the vendor stands behind its products. System redundancy is also crucial to 24/7 availability. Best-in-class video walls with telecom-grade power supplies help ensure maximum uptime.

Secure solutions

In mission-critical communication and real-time surveillance environments, secure AV solutions are top priority. Protecting confidential communications and proprietary information is a key consideration of many control rooms, especially for military applications. Best-in-class LED and LCD video walls leverage fiber-optic technology to ensure secure communications. Projection technology offers secure memory processing and the option to disable near field communications, eliminating the possibility of system or data breaches.

3D solutions – 3DLP projection and LED

3DLP 3D projection

Some 3DLP® projectors have high frame rate and 3D stereoscopic capabilities, empowering highly immersive visual experiences. For decades, government and defense divisions have put them to use for their visualization needs and in simulation training environments. Equipped with advanced electronics capable of 1.2Gpx per second processing (such as Christie's proprietary TruLife™ platform), these 3DLP projectors provide unsurpassed image fidelity with native 120Hz performance and higher. They're available in a range of brightness levels, resolutions and illumination technologies to meet project specifications and budget.

3D LED – Active 3D

Using active shuttered 3D glasses, users can view 3D LED content at 120Hz (60Hz per eye). With Active 3D, LED displays can offer 4KD UHD content at 1000 nits brightness in combination with 3D video wall controllers. Active 3D capabilities are designed for users who demand the best in 3D visualization, making it ideal for the aviation, military, and simulation training environments that government and defense divisions rely on.

Professional services for government

The right vendor offers professional services that act as a trusted extension of your AV/IT personnel, ready to support your mission. You should feel supported with customized service level targets and agreements that protect your investment, offer peace of mind and real value, no matter where in the world your Christie solution is stationed.

Comprehensive and multi-tiered service and support can include: extended warranty support, 24/7/365 remote tech support staffed by trained employees at a world-class network operations center (NOC), preventative maintenance and emergency field service visits, enhanced logistics support, escalated response times, and product insurance for secure spaces.

⌃ *BATON ROUGE, LA – Coastal Protection and River Agency (CPRA) river model – Christie® projection mapping helps the CPRA and LSU Center for River Studies communicate the coastal crisis. The innovative AV solution is powered by 20 x Christie 3DLP® projectors, with Christie Mystique™ for blending the multi-projector display, and Christie Pandoras Box® for content processing and show control. [Keep reading »](#)*

Conclusion

Building on a solid understanding of technical options and a strong familiarity with the potential use cases, AV professionals across all levels of governments can discover a world of visual technology options and realize nearly limitless potential in the design and creation of high-impact visual displays suited to every type of audience, security need, venue, and application.

Christie – your partner for secure data visualization

When America's most highly secure government divisions need innovative AV solutions, they rely on Christie®. For decades, we've been called to serve the most important Federal and State departments, including the Federal Emergency Management Agency (FEMA), U.S. Army, U.S. Air Force, NASA, FBI, and Homeland Security, as well as State police departments, transportation and research labs.

We can design and build complete integrated AV solutions, from small- and mid-sized projection systems to high-end video wall and image processing technologies. We design our products to work together to create integrated solutions that fit your needs and your budget.

We can connect you with a preferred Christie AV integration partner through our extensive network.

With headquarters in Cypress, California, we're proudly based in the U.S.A. You can rest assured knowing our government solutions are TAA-compliant and that you're partnering with a company with deep roots in America.

For the most current specification information, please visit christiedigital.com

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