SAMSUNG

White Paper:

The Ultimate Videowall Guide

How to Plan and Build the Optimal Videowall for your Organization



Introduction

Getting the desired return through big LCD and LED videowalls requires a strategy, careful design, planning and execution.



Many of the constraints – like overcoming ambient daylight's glare and fitting displays into a room or building's shape – are going away, or already gone. The possibilities are endless, but videowall projects aren't successful just because the technology fits. Getting the desired return through big LCD and LED videowalls requires a strategy, careful design, planning and execution.

This paper explores the use-cases for big videowalls, the evolving technologies, the challenges and how to overcome them, how to plan and succeed, and where this technology is all going.



Two Ways To Build A Wall

The two most commonly used technologies for creating videowalls are LCD and LED - two very different technologies that sometimes get confused because the current generation of Liquid Crystal Displays (LCDs) used in LCD video displays, use Light-Emitting Diode (LED) lighting to illuminate the thin liquid crystal display layer, from behind or around the edges. For the latter, that's why you will sometimes read about an LED edge-lit LCD display.

The new generation of indoor LED displays on the market are also called direct-view LEDs, because instead of LEDs just being the hidden lighting source for another technology, like LCD, viewers are looking directly at the tiny LEDs that are creating the visuals.

Here's a closer look at the two:

LCD Videowalls

LCDs deliver high definition visuals – all the way up to 4K ultra HD – that look great from any distance and usually from wide viewing angles. They also make it possible and relatively easy to introduce touch interactivity by adding overlays or sensor frames around the perimeters.
These LCD videowalls are aggregations of individual displays, all snugged together in different configurations to create much larger visuals – invariably as rectangles of different dimensions. They most typically get arranged in a variety of clusters, such as 2 wide by 2 high, or 3 high by 6 wide.

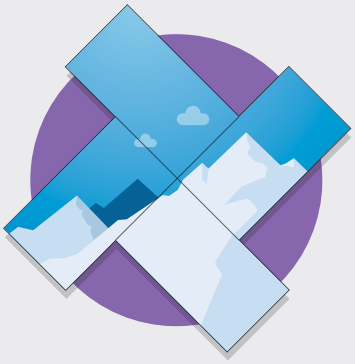
In recent years, inventive new shapes and clusters have adapted ideas like herringbone patterns, or used unusual LCDs like Samsung's square LCDs to mix and match with more conventional rectangular displays.

The frames around the edges of these displays, which hold them in place, are called bezels. Those bezels have grown steadily thinner through the years. Five to 10 years ago, a videowall had very noticeable gridlines because of thick bezels. For videowalls that ran content across all the conjoined panels, the aesthetics weren't great. Text and images were interrupted and broken by large seams.

These days, bezels are far thinner, and all but disappear when seen at a reasonable distance. There is a pricing premium on those LCDs with what are termed ultra-narrow bezels, and costs go down as the frames get thicker.



Looks great from any distance and usually from wide viewing angles; can use touch interactivity



Inventive new shapes



Bezels have grown steadily thinner through the years



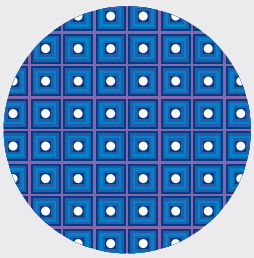
More budget friendly

LED Videowalls

Direct-view LEDs have been around for many years in the indoor market, but it's only been in the past few years that they've gained much attention or use. The jump in interest is because of something called pixel pitch – the term used to describe the distance in millimeters between the LED light clusters. We've all seen big LED displays on highway billboards, used as stadium scoreboards or running advertising in places like Times Square. Those displays all used LED displays with lower resolution pixel pitches, generally 6mm and higher.

A common rule of thumb: every millimeter of pixel pitch equates to 10 feet of viewing distance. So, a 6mm pitch display is optimally viewed from a distance of at least 60 feet (6mm X 10'). The closer viewers get, the more the content of the displays start to visually "pull apart" as the gaps between the LEDs grow more evident to the eye. The new generation of fine pixel pitch indoor LEDs have gaps as fine as 1mm or less. That means they can deliver 1080P HD viewing quality from just 10 feet away, and stepping further back, most untrained eyes would struggle to tell the difference between LED and LCD.

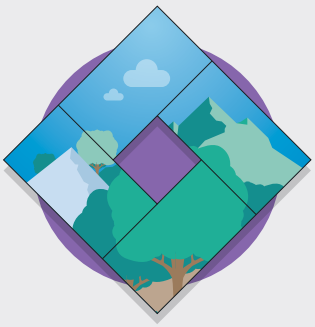
The biggest difference with LCDs, apart from viewing distance, is the lack of any seams on LED displays. The modules fit together like tiles, with no visible gaps. A high quality LED display, expertly installed, looks like one continuous, unbroken image.



The new generation of fine pixel pitch indoor LEDs have gaps as fine as 1mm or less



There are no seams on LED displays



Inventive new shapes



A high quality LED display, expertly installed, looks like one continuous, unbroken image

Videowall Basics



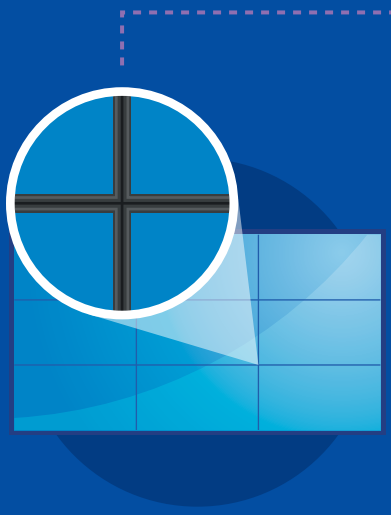
Direct view LED

Millions of light dots on rectangular or square black tiles, no bezel

The closer the distance between light dots, or pixel pitch, the better they look up close

No visible seams between LED tiles

Best for large, spectacular canvases



LCD

Joining multiple displays to make video walls creates visible seams, but those seams are getting smaller with slimmer bezels

Much more budget-friendly

Similar technology to consumer

LCDs support up close viewing and touch interaction

Videowalls In Use

The use cases for videowalls are broadening all the time. Here are some common examples:

Retail – Videowalls displays are used as feature walls in large retail environments, as backdrops at cash and customer service areas, but also as primary architectural features. Samsung's New York flagship store, called Samsung 837, uses 96 of its 55-inch displays for a three-story-tall videowall that is the centerpiece for store activities;

Hospitality – Hotels use smaller videowalls as design features at reception, as interactive digital concierges, and as architectural features – everything from ambient art walls in restaurants to spectacular digital lobbies, like The Cosmopolitan Hotel in Las Vegas;

Mass Transport – Airports are heavy users of videowalls to communicate with travelers directly at check-in counters and on the concourses, such as at McCarran International Airport in Las Vegas.





Fit to Purpose

So, what's the right technology to apply?

Budget: LCD video display walls will, with ultra narrow bezels, generally cost anywhere from half to a fifth the cost of a fine pixel pitch display of the same dimension. Costs for the finest pitch, sub-1mm LED modules are very high because of low production volumes and manufacturing complexity, but those costs drop as the pixel pitch increases. The price gap between the two technologies is closing, and some industry experts suggest they will be at parity in three to five years, as production volumes increase and competition forces prices down.

Shape: LCD displays are somewhat constrained by their shape, though there are limited numbers of square and wide-stretched displays on the market. That means LCD videowalls are usually some form of rectangle. LED modules, on the other hand, are like tiles. The tiles tend to be smaller than LCD displays, and can more readily fit into spaces with odd and varied dimensions.

Lighting: Ambient lighting conditions, such as a sun-filled atrium in a building, or a storefront window, can overpower conventional LCD displays that don't have sufficient light power to make visuals cut through glare. Manufacturers such as Samsung have premium, daylight-readable displays that work well even in direct sunlight. LED displays, generally, have designed-in brightness to win those battles against direct sunlight.

Distance: How far away will viewers typically be from the display wall? Close proximity best suits LCD, because visuals will look vivid and sharp even up close. That's not the case, even with the finest pitch LED. However, if viewers will be 25 feet away, a relatively low-cost 2.5mm pixel pitch LED wall will deliver big, rich and seam-free visuals, with no discernible difference in clarity from an LCD wall.

Content: What are your programming needs and plans? Videowalls are used in very different ways, and a content plan will help dictate technology choices. For example, a command and control room for a public utility or transport systems may use a videowall to show a test, images and charting in fine detail, and high-resolution LCDs will do that best. But the lobby of an office block may have a huge videowall in place largely to create a visual experience for visitors. In that use-case, lower resolution LEDs are often ideally suited.

Physical Constraints: A big videowall fills an area like a building lobby or feature wall in a store, but it also removes space if the technical design is not carefully considered.
The issue is installation and servicing. Choosing the right mounting technology can mean the difference between a videowall that pushes out two to three feet into a space, and one that encroaches only by a matter of inches. Simply put, if saving space is important, you want mounting systems that pull out to allow rear servicing, or LED displays that have thin side profiles and can be installed and serviced from the front.

LED Viewing Distances

Use this simple rule of thumb to determine the right minimum viewing distance for direct view LED videowalls: 1 mm = 10 feet. For example, a 1 mm pitch videowall will look best from 10 feet back.



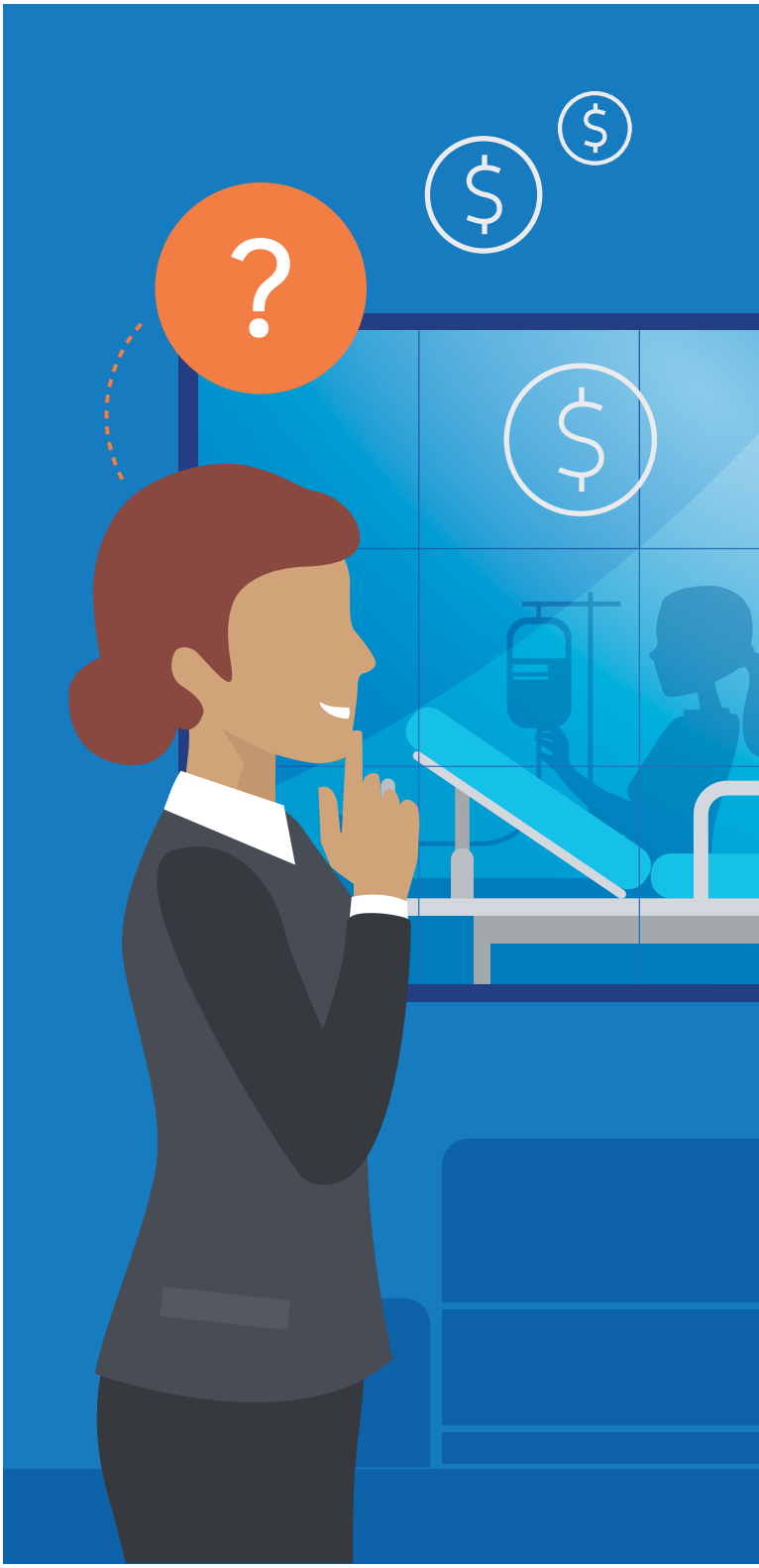
- 1 mm = 10 feet
- 1.5 mm = 15 feet
- 2 mm = 20 feet
- 2.5 mm = 25 feet
- 3 mm = 30 feet

Planning Your Project

A videowall project's success will trace back to the first meetings, when the team starts answering some basic, but critical, questions about objectives, strategy and execution. You can get all the technical details right, but if there isn't a clear strategy and content model, the project may struggle and languish.

Questions to ask at the planning stage include:

- What is the videowall intended to do?
- What communications problem or opportunity is it trying to address?
- Is the targeted location appropriate, and optimal to meet those objectives?
- Who is the target audience? Why is a videowall the best solution, and not something else?
- How will the programming be refreshed, and with what? Who owns that budget?



The point here is that planning meetings should start by asking and answering a lot of Who, What, When, Where and Why questions.

For example, a large videowall in a flagship retail space is probably not there to promote sale items. It's there to reinforce the brand and set a tone.

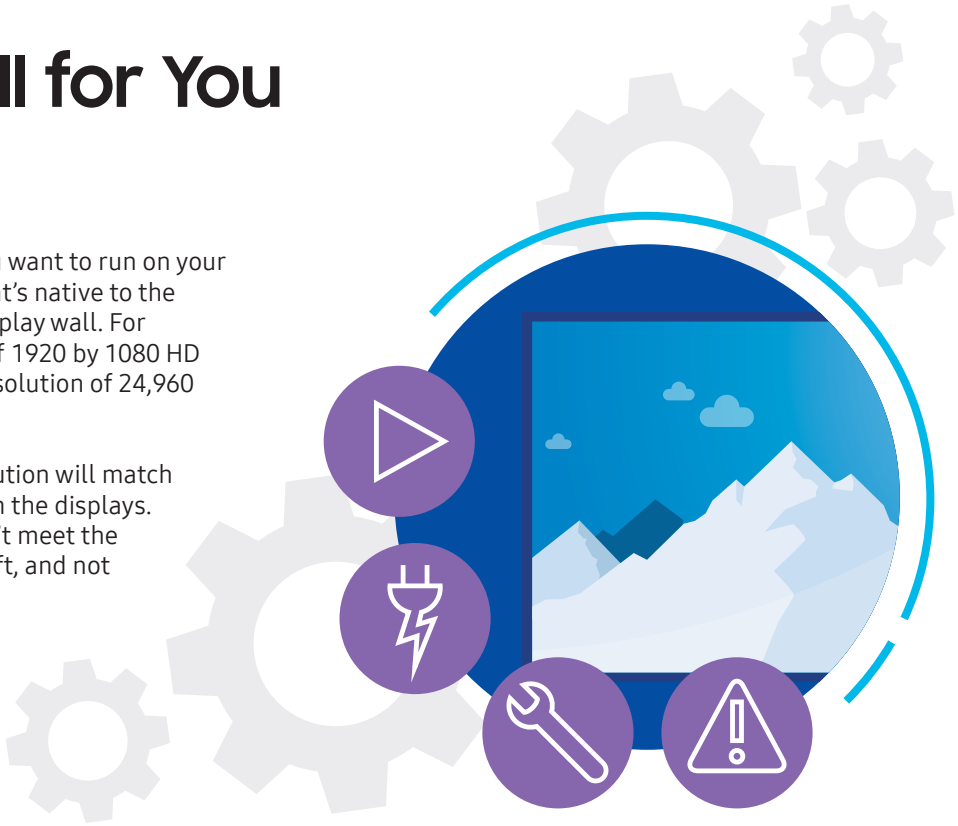
A videowall in a hospital lobby may be there to celebrate accomplishments, thank and honor donors, and reinforce hope to patients and families. Both of those examples are real objectives. They set the tone for the programming model and inform decisions about the technology needed to support that level of programming.

You want to fully understand what will be communicated, and what it will look like, before starting to make technology decisions. The design and scale of programming content has a direct influence on technology choices.

The Right Wall for You

What's the resolution of the content you want to run on your videowall? Ideally, you want content that's native to the display resolution of the aggregated display wall. For example, a 6 high by 13 wide LCD wall of 1920 by 1080 HD resolution displays has a total native resolution of 24,960 by 6,480 pixels.

Producing custom content to that resolution will match the pixels in the creative to the pixels on the displays. If you try to go with material that doesn't meet the resolution, it may look stretched and soft, and not meet the visual objectives.



Kit Of Parts

Displays

Choose between LCD or LED based on the needs and objectives, and the operating dynamics and conditions of the space.

Mounting

Professional mounts use precision machined metal to hold displays and related gear securely, and enable installers to tightly, perfectly join and align videowalls.

Software

The complexity and diversity of the programming model for the videowall has a direct bearing on what software to use. Scores of digital signage content management systems can provide all scheduling and management tools for scheduling and running content. However, if a videowall is there to run one or just a handful of video clips, a full digital signage CMS may be overkill, and the display or media player manufacturer may have a suitable low-cost or even free solution.

Playback hardware

The right device to drive content to videowalls depends on content, and in some cases, on the display technology being used. A single PC can, in theory, drive a videowall on its own, with just its built-in graphics capabilities. However, most systems integrators recommend other approaches – like a more powerful PC that has multiple dedicated graphics cards that can target each display, or drive a full resolution display canvas. There are also dedicated videowall processors or controllers that take a PC signal output and split it into multiple outputs.

Other contributing factors:

- **Weight** - will the floor safely support the added metalwork and electronics?
- **Energy consumption**
- **Safety** - in rare instances, improperly installed and secured videowalls have collapsed, sometimes causing injury and even death
- **Tamper-proofing** - LED modules are typically unprotected and their edges brittle, meaning they can be damaged if within public reach

A 6 high by 13 wide LCD wall of 1920 by 1080 HD resolution displays has a total native resolution of 24,960 by 6,480 pixels.

Bottom Line

A big videowall may just look like a really, really big TV, but there's a lot going on – from the idea stage through to execution. It's easy to get things wrong, at every stage. The best advice is to work with a display manufacturer partner, and their software or pro AV consulting partners, to work out the objectives and strategy, capital and operating budgets. They can then help identify experienced systems integrators to put together and deliver a project.

Get a videowall project wrong, and you have one very big monitor taking up space. Get it right, and you have a compelling digital canvas that powerfully drives and delivers on objectives, whatever those may be.

Learn more: Digital Signage Solutions from Samsung.

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