# **My First Video Wall** The Ultimate Step-By-Step Guide





## **Overview**

- 1. Screens
- 2. Software and Media Player
- 3. Connections
- 4. Costs
- 5. Conclusion



## **?** "We are drowning in information, starved for knowledge."

- John Naisbitt, Megatrends

The communication with the customer of the 21st Century presents companies with a central challenge – placing messages into the customer despite overstimulation. The consequence is an increasingly shorter advertising contact, which is only in the second range, as well as a certain recording resistance on the part of the customer.

The customer often brings only a little interest in the information offered, so that the information, that is more conspicuously presented as others, or is presented to individual needs, attracts more attention. Supporting an unusual representation can spark the interest of the customer. All these aspects speak for the operation of Digital Signage installations. Especially video walls are increasingly finding their way into the public light.

## Size – The Decision Maker

Size Matters: At Least When Speaking of Video Walls. This is of Great Importance When Communicating Memorably About Brands. The Following Examples Illustrate the Supported:

#### 2013

The cube opened in February 2013 at the University of Technology in Brisbane. The worlds' largest multi-touch installation consists of 48 multi-touch displays, 14 HD projectors as well as 55 speakers. With a height of a 2 story building constantly changing content is presented. Daily different Information events of diverse subject areas are demonstrated on the cubes' touch display. An interactive program, games, and competitions extend the content. Even professors of the university put the cube to use for workshops and also as a component of their lectures.



#### 2014

The next highlight released in November 2014 already. The largest LED video wall of the world yet is at Timesquare in New York. This giant provides visual hearing with the help of pictures, represented by 23,8 million pixels on an area of 2380 m<sup>2</sup>. To put this into perspective: A 4K-monitor delivers 9 million pixels so that on this digital advertising screen 2-times 4K next to each other are presented. The video wall guarantees attention between the dazzling lights of the city – the city that never sleeps.





#### 2015

Just one year later, in November 2015, the Digital Signage world was surprised by a new superlative attraction. The international airport Incheon in Seoul released the largest OLED wall in the world. Consistent with 2 elements this completely curved installation still has no competition. 140 55" curved screens build an area of 13x8 meters each. The 104 m<sup>2</sup> are the result of a matrix of 10 x 14 devices. This corresponds to an area which is larger than most peoples' living space.

## **Components of a Video Wall**

When Speaking of a Video Wall Realization, the Preparation is the Most Important.

A lot of points have to be considered. This white paper will assist the process and to light up the essential aspects as a guide.

# **1**. Screens

Special screens need to be used on the video wall. This has different reasons. Even though from the outside it looks similar to other TVs, there are substantial technical differences. Normal TV screens are designed for the daily use of up to 8 hours. Displays that are designed for video walls are able to be operated 24/7.

In addition, there are differences in the installed power connectors, for example, safety regulations and certifications for the outside use. Another difference is the brightness of the screens: Because whoever wants to stand out in the second communication of the 21st stand centurv should he able to from the floods of information. out

By screens in the consumer spectrum, this number is usually 300 candelas per square meter (cd/m<sup>2</sup>). Screens for video walls produce a brightness of between 500 and 700 cd/m<sup>2</sup>.

Outdoor installations will be equipped with displays of up to 2000 cd/m<sup>2</sup>. LED-monitors are even able to reach up to 7500 cd/m<sup>2</sup>. This high value is necessary to guarantee a good image and visibility even in strong sunlight. Additionally, the screens for outdoors have to be a sturdy build, in order to withstand the different environmental influences and weather zones.

# Large Format Display Versus the Video Wall

In the area of the video wall, two fundamental variations are differentiated. The video wall could either consist of one or be an arrangement of multiple screens. If it is a single screen device, we are talking about a large format display. For this purpose, especially large displays will be used, which have grown to be in high demand. Currently offered are screens with display diagonal measurement of up to 98" (248cm). These giants deliver, even with their size, a sharp picture and a resolution of UHD2 (7680x4320 pixels). Additionally, it is not rare that these large format displays are equipped with touch functions, which enable interactive content to be displayed. Depending on the size, the model and the features, the installation of the screens comes at a cost of up to 54,000 Dollar (for a 98" display).

In a classic video wall, several screens are constructed together to form a larger area. In these installations, the displays are usually assembled in sequence 2x2, 3x3, 4x4 or 5x5.

# Attention through Creative Solutions

In addition, there are horizontal or vertical setups, in which the requested 1x2, 1x3, or 3x1 alignments are constructed. Generally, any shape or form is possible taking the outside measurement of the screen into account. Some installations contain gaps, which for aesthetic reasons are intentionally kept between the screens. Besides that, screens are able to be installed out of their regular group arrangement so that the eye of the observer is stimulated with extraordinary forms – pop art digital, welcome to the 21st century.

## POP ART DIGITAL, WELCOME TO THE 21ST CENTURY

This artistic and at the same time creative buildup is also known as 'artistic format' and is especially used in lifestyle oriented environments, such as fashion stores. The main focus here is on image targets and the emotionalisation of the shopping center through highly visual content.

For rather functional installations art format is less suited since messages such as text elements are difficult to reproduce without losing content.

#### **Distance matters**

In order for the picture information to be broadcasted on the integrated screen you would use processors and diverse cables. Generally, the installations are mounted in a way that the observer can keep a significant distance from the device. Many of the displays have frames that create gaps in the image and therefore cause an optical break in the overall picture. This effect can be minimized through the distance the observer keeps to the video wall. The bigger the distance, the smaller the gaps seem.



# L = Liquid C = Crystal D = Display

#### With the Right Screen to Success

The right screens are essential for a video wall project. Since each installation is its' own challenge, it is important to understand the pros and cons of the individual properties of the screens. The forward planning not only ensures the success of the project; it also ensures to better estimate the costs of the purchase and maintenance.

In addition to the basic technical data, there are other factors that should be taken into account individually depending on the project. These include the viewing distance and angle, but also the ambient brightness. The location, whether indoor or outdoor, plays a major role, as well.

With regard to the choice of screens, the following options are available: LCD, LED and OLED. Additionally, we introduce the younger LPD-technology that, in comparison to the alternative, is not as relevant to the display and Digital Signage market at this time.

#### LCD

The abbreviation LCD stands for liquid crystal display. Hereby the principle of the polarization is described by light through the electrically heated liquid crystal. These liquid crystals control the direction of the light with help of the electrical tension. LCD panels do not have their own light power and therefore must be flushed.

The monitors are equipped with LED backlight technology. The LCD layer is in the background and produces the needed light, which shines through the overlaying LCD layers. The crystals react to the light and build the content upon that. The liquid in which the crystals are located is the reason for their inertia. As a result, fast picture changes cause motion blurriness. That is a huge disadvantage of this technology since video walls live on moving pictures.

#### **TFT-Technique**

As of now, most LCD monitors are equipped with the TFT technique. Smaller pixels and a larger amount of pixels are reached due to this advancement. This results in a larger viewing angle, which is a significant plus for video walls. At the same time, it is important to remember that LCD screens can have weaknesses in contrast: the reason for this is the background lighting that, depending on full-backlight or edge-backlight, is able to control the crystals to perform more or less accurate. Even black tones can be less strong and therefore, the picture will seem less lively.

**Reasoning:** The crystals are not able to block the light completely so that no black comes forward (only dark-grey). Through this the contrast is weak. Some manufacturers try to control the LEDs in the back in a way that the larger black areas will be darkened out.

#### **Brightness and Sharpness**

The lighting can be differentiated between edge-LED and direct-LED. With the edge-LED variation, the LEDs are located on the screen edge. The advantage for the video wall lies in the very flat construction opposed to full-surface backlighting. However, the picture can be less consistent and strongly illuminated. The direct opposite is direct-LED. Through the consistent arrangement of the LEDs, the entire screen area gets illuminated equally and a more radiant image can be produced. Edge-LED screens are less expensive from the manufacturing standpoint, and therefore more attractively priced as the direct-LEDs.

Nevertheless, when choosing, the priority of better overall picture vs. cost should be carefully considered. In conclusion, there is to say that both variations for a video wall are fairly affordable.

#### Resolution

Altogether LCD screens score high in resolution and in good picture quality. Full HD (1920-1080 pixels) and UHD (3840x2160 pixels) are the standards. A few devices are even able to perform at UHD2 (7680x4320 pixels). This pixelation enables the sharpest pictures, even in close viewing distance. In video walls, the resolution is extremely important, as the following example demonstrates: This video wall consists of 2x2 screens. These have an HD-resolution (1280x720). The incoming signal is now divided into 4 screens. This results in a resolution of 640x360 pixels per screen. Thus the screen quality suffers on the low pixel example. If using UHD monitors on this same installation, the resolution outcome will be 1920x1080 per screen. Therefore each of the screens is able to reproduce a full-HD picture, which is now assumed by the observer as a matter of course.





#### **Black Pixels**

It is possible that individual pixels malfunction. Either they are stuck in a specific color, or they are completely inoperative. With the right software, the corresponding pixels can activate again. Dead Pixel Tester (DPT) is such a program and is available as a free download on the internet.

When a certain number of inoperative pixels are met, the devices are exchanged by the manufacturer. As usual in the sense of ISO 13406-2, the manufacturers orientate themselves to the pixel error class II. By default a TFT display with a resolution of  $1920 \times 1080$  pixels is defective if more than four pixels are constantly lit, four pixels are constantly black and up to ten sub-pixels are defective.

#### **Bezel Width**

Until recently the bezel width was the largest disadvantage of screens. The goal is to have the narrowest frame possible on the video wall (extreme narrow bezel). The frames cause an optical grating in the motif. That affects image perception. But even here the manufacturers reacted and offer devices with up to a 3.5 mm slim edge. Screens in this class, for example, are already built in control rooms, areas in which the observing distance is sometimes very small. We can conclude: the thinner the frames, the more expensive the end product will be. Therefore the viewing distance of the video wall should be taken into account with regard to the frame width. If this tends to be bigger, the frame will also be a bit wider.

> GOAL OF THE VIDEO WALL IS TO HAVE THE THINNEST POSSIBLE PICTURE FRAME

#### **LED Module**

LEDs are not only used to light LCD screens, but also for the production of LED modules. These panels can be cascaded to generate a large video wall. LED stands for light emitting diode. Colored panels of one LED consist of 3 diodes. This way the colors red, green and blue are covered. With these colors, every one of the 16.7 million colors is able to be produced. When adding them all together, one gets white. In comparison to the LCD technology, the LED panel can light up independently. The punctual radiation ensures brightness as well as the consistency of the image and thus covers two important prerequisites for a video wall.

#### **LED for Outdoor Area**

Brightness is essential in the outdoor area. As already discussed in the above section, LED devices are able to reach up to 7500 cd/m<sup>2</sup> and therefore can still reproduce a bright picture even in strong sunlight. Another essential of a successful installation is that all displays light up evenly. The LED panels are leaving their competitors far behind. Tests have proven that LED modules provide 97% consistency in brightness. The drawback lies in the low resolution. LED video walls are therefore more popular in the outdoor spectrum, stadiums and at events. Here it is ensured that the observer is keeping a greater distance and the resolution is secondary.



#### **Pixel Spacing**

The pixel spacing describes the distance from the center to the center of two pixels. With values of 3 to 25 mm, LEDs are not the measure of all things in terms of pixel density. The possibility of improvement has taken some manufacturers to heart. By now, there are LED panels with a pixel pitch of 0.9 mm. Thanks to this improvement, the technology is now able to celebrate the move as a viable alternative for conference room installations. Especially interesting will be LED screens through the possibility of seamlessly joining one another. In combination with the pixel spacing, the elements are able to also point in the shorter distance. In order to sharpen the picture, the LED technology supports the blinking and scanning process. With this, either all or just a part of the LEDs will be turned off completely for a short period of time. The human eye is not able to process this change, which happens in milliseconds, and will, therefore, perceives the image as even sharper.

### **Pixel Spacing** in Meter Instead of Millimeter = **Minimal Distance** to Installation

25<sub>mm</sub> Pixel Spacing 25<sub>m</sub> Distance to Installation

#### Lifespan

Besides the high lifespan of approximately 100,000 hours, about eleven years, the panels are proven to be very energy-efficient. The higher acquisition costs in comparison to LCD screens are therefore counter to the short-term amortization period by saving electricity costs and little maintenance. Additionally, LED screens are flexible as well as vibrations- and shockproof. These properties reinforce the use of outside technology.

#### OLED

The OLED technology needs, in comparison to the LCD displays, no background lighting. This is thanks to the self-lighting pixels. Each individual organic light-emitting diode ensures a point-accurate color reproduction and produces the liveliest and most contrasting images of all the alternatives. Especially characteristic for OLED screens is the deep black since the light diodes turn themselves off in a picture of complete blackness. The sacrifice of the background lighting enables a flat build of only a few millimeters and a low weight. OLED screens are applied especially in lifestyleoriented scenarios and places of the openness since they improve the customer experience by a lively image reproduction and their flexible forms. The still considerably higher cost, as well as shorter lifespan of the screens, let the OLED video walls still occur seldom, compared to the ICD installations.

#### **Contrast Behavior**

Since black areas in a motif are rendered by inactivated pixels, these sections remain black. This black is, compared to the traditional LCDs, especially deep, since every single diode is able to be switched on or off. However, in the backlight technology (LCDs) only certain areas can be darkened: a tiny part of the backlighting still shines through so that the color black can seem as a very dark gray. The picture suffers from this and does not appear as lively and color intensive as the OLED technology. But, the organic substance loses the shining power followed by the color. Blue tones are mostly affected. Currently, these devices have a lifespan of approximately 25,000 working hours (about 3 years). That speaks for half the lifespan of LCD screens.

#### **Fast Images and Soft Curves**

The devices can withstand a reaction time of 0.001 milliseconds, which ensures a brilliant result even with fast movements. This value exceeds previous values (of LCD) by about a thousand times. Because of the thin design, OLED screens are more suitable for the 'curved' form. This allows astonishing projects to be realized especially in Digital Signage installations (Seoul Airport). Until now, the technology has not yet been able to confront the LCDs, as some of the disadvantages have not yet been overcome even with the great development: on one hand, the lifespan is relatively short - at about 3 years.

On the other hand, the production costs are still relatively high so that these costs are undoubtedly higher than the LCD screens. The OLED technology should be used as an alternative if the Digital Signage installation is primarily based on atmosphere and visual stimuli. This is true, for example, in highly emotionalizing business models. These measures should be balanced with that of the price: if the latter is the focus of the implementation, LCD installations are a suitable alternative as they can also display extremely strong images through advanced technology.

	LCD	LED	OLED
Lifespan	60,000 hrs	100,000 hrs	25,000 hrs
Cost	$\odot$	÷	$\odot$
Energy Consumption	<b>5</b> <del>5</del>	4	4
Contrast	*	××	<b>**</b> *
Pixelpitch			

#### LPD

LPD (Laser phosphor display) is the newcomer on the market. Prysm, the industry leader in video walls from Silicon Valley, presented this technology in 2010 for the first time. A laser beam, with the help of mirrors, is shot onto the phosphor layer. This phosphor gives off a reaction of red, green and blue light. Similar to the OLED displays, the black picture areas are not activated. This way, a high contrast motif is displayed. Individual application examples can be found on the web, but this variation cannot yet be described as standard.

#### **Characteristics**

The screens, which are based on laser technology, save up to 70% energy compared to conventional technologies. This is reached through low operating temperature which excludes the need for additional cooling elements. This, in turn, lowers the operating cost. The high repetition frequency of 360 Hz results in flicker-free images. Just like LED panels, these elements can be built seamlessly, so that the screens merge to form an image without gaps. Another advantage is the elimination of motion blur.

Additionally, the technology has a wide viewing angle of 178 degrees so that installations can be viewed almost anywhere on the wall. Another exciting aspect is the scalability of the elements. With these screens, installations with unrestricted size will be able to be built and in the future could mean for large interesting projects.

The lifespan can keep up with previous technologies – at about 60.000 hours. This is approximately 7 years in continuous operation. The largest disadvantage is the mounting depth: about 40 cm space intensive and therefore for certain applications extremely inconvenient.

#### **Sustainable Components**

The components used in this built are not poisonous and therefore recyclable - An extra point in sustainability. The acquisition costs are not openly communicated but however can be requested directly from Prysm.

www.prysm.com/laser-phosphor-display

# Possible Arrangement of the Screens

When it comes to the arrangement of the screens there are only little boundaries. This way, the actual form of the single screens has the largest influence in the end format of the installation.

#### **Vertical and Horizontal Formats**

The most common format of a video wall is the 2x2 arrangement. It displays the classic horizontal (landscape) picture. On the one hand, the manageable number of four screens is also affordable for smaller projects: at the same time, the format generates a natural image and corresponds to the viewer's usual eye. Additionally, the available space plays a large role in the installation and makes this 2x2 videowall more attractive for smaller retail stores.





#### **Advertising Boards**

Video walls can also be installed as wide horizontal formats. The screens are mounted as 1x2 or 1x3 assemblies: as in one monitor for height and two or three for the width. This design, in comparison to landscape, is less suitable for the classic advertising medium. It assists through emotionalizing images, however, the buying experience at the point of sale.





#### **Giant Poster**

If the content to be displayed is to be increased in height and thereby be more prominent at greater distances, vertical set ups (portrait) are suitable. Thus 3x1 and 3x2 assemblies seem like moving huge posters and jump, because of the form, in the eye of the observer. The purposes of use are also different here, with image targets and receiving attention being the focus of this arrangement as well.

#### **Squares**

Another possibility is square installations. Due to the symmetry, this arrangement displays calmness and the image is perceived as pleasant. Since not all contents are able to be displayed in this setup, the content for this installation has to be customized. Otherwise, important aspects of the picture will get lost because bleed is not equal section.



#### **Individual Assembly**

When wanting to create something special, the screens are able to be assembled individually. Slanted monitors or gaps in the construction can reach special attention. At the same time, however, more effort and expenses may be required for this plan. Since these free-lanced forms are not of the ordinary, different components, for example, the mount must be individually installed. This type has a high impact on the shopping experience, especially in the store window, and generates a greater attention of the customer. WHEN WANTING TO CREATE SOMETHING SPECIAL, THE SCREENS ARE ABLE TO BE ASSEMBLED INDIVIDUALLY.



#### Mounting

Since video walls are mostly found in places with a lot of population, the right mounting is lifesaving. This proceeds with additional, modular elements. Components are similar to systems that are also used to suspend normal consumer devices. Video wall systems are added, which have functions that ease the installation as well as the exchange of screens. Through the push-function, single screens are able to be removed for maintenance while the others stay intact and in working order.

Depending on the area and the individual circumstances of the installation the mounting is chosen from a base, a wall mounting or a ceiling mounting. The mountings are able to be customized to the number of displays, as well as their size. A lot of times the mountings are interchangeable and fit between 36" to 60". The actual number of displays is not a problem since the mounting can be extended piece by piece. In order to get more stability, the individual elements are often screwed together.

## CHOSEN VENDORS OF MOUNTING SYSTEMS

www.peerless-av.com www.chiefmfg.com www.planar.com www.premiermounts.com

#### Calibration

A video wall should primarily produce a constant image as the human eye reacts very sensitively to color differences. That is especially important when the screens are installed directly next to each other. If several screens are installed, they must be planned in advance. This process is called relative calibration. Hereby, the data of the different devices will be compared and corrected.

Especially when it comes to luminosity, brightness, and color the screens can have large differences. Measurable are these values through a spectrometer or through WiFi connection using software. In the end, the calibration program determines the needed configuration of the individual screens. The goal of the successful calibration is that all color irregularities are fixed and therefore the surface reproduces a constant image.

When video walls are installed in such places such as TV-studios an absolute calibration is necessary. Hereby the monitors will be completely calibrated to the lighting and illumination of its' surroundings. When a screen is exchanged, the whole process will be repeated. The same takes effect to the lifespan of the wall. Since monitors age at different paces, a calibration should be done on the regular. Generally, it is suggested that this procedure is done by experts and with the appropriate equipment. This way the result will be optimal and color real.

Especially in an area of application such as a control room, for example in hospitals, a uniform color reproduction is important, since colors there have different values and a wrong color reproduction can cause a wrong diagnosis.



# **2.** Software and Media Player

Another essential part of the video wall besides the monitors is the software. This includes the content management system (CMS), which enables, among other things, the administration and broadcasting of the respective messages. This includes functions such as the distribution of the image information to the various monitors, the processing of the content, and the integration of external data. With the CMS you can also create timed playlists, exchange motifs and update content immediately.

#### **Media Player**

The media player is an additional component of the installation. The choice of the player is hereby just as crucial as the additional components themselves because it sends the signals to the screens. An important aspect that is to be considered in this connection is the resolution. The media player has to be capable of a resolution of at least UHD (3840x2160 pixels) when considering a video wall that is 2x2, to be able to play in full HD resolution on your video walls.

Additionally, the surroundings of the installation should be considered. Depending on the individual conditions, the player should be heat- and cold-resistant. It should also be able to withstand vibrations through construction sites or underground railroads if installed outside. As a rough orientation, it should be in a place of operation under 30 degrees Celsius and enough air circulation should be present so that the cooling system works. Players that are professional grade can sustain the heat of up to 40 or 50 degrees Celsius without problems. If the video wall is meant for 24/7 operation, the media player will need to be made specifically for that. Generally, the media player should come preinstalled with the needed software. This makes commissioning considerably easier. However, so-called blanco-players are used if the software is already in use. Since this is pure hardware, additional costs may arise for the necessary consultation and installation of the programs. At this stage, it is important to consider that the software and the operating system are compatible. **The player could use Android, Windows or Mac for example. In order for the software to be recognized, it has to be usable on the chosen operating system.** 

#### **Recommended Player:**



#### System on Chip (SoC)

SoC devices are another alternative to media players. These are screens in which processors with the corresponding software solution are already installed. Thanks to the integrated solution, operating costs can be reduced by low power consumption. An advantage of the SoC devices is the easy installation. Most of the media players require to be plugged in externally and therefore also require their own electricity plug. SoC devices, however, do not require any additional wiring. Depending on the location, the media player must also be accommodated so that external brackets may be necessary.

This decision: whether a SoC device or an external media player will be better depends on the project. In terms of flexibility and deployment scenarios, however, the player offers more possibilities and computing power than the system on chip screens. This is especially the case with video walls that are based on 4K content or interactive elements. Additionally, the player can be used for different presentations, which shows a higher flexibility. The possibility to influence the capabilities between player and software is void with the SoC. That makes a system change or upgrade difficult to a degree of having to purchase new screens.

The ordinary stronger processors and graphic cards make the media player the better choice, especially for complex video wall projects. WHETHER A SOC DEVICE OR AN EXTERNAL MEDIA PLAYER WILL BE BETTER DEPENDS ON THE PROJECT.

# **3**. Connections

#### Video Wall Controller Versus Scaler

Previously defined content is played back with a video wall. In order for the content to be adjusted to the arrangement and numbers of screens, additional hardware components are necessary.

#### **The Controller**

The controller is a connection piece between the media player and the video wall. It is a device with several inputs and outputs. The information medium and the screens of the video wall are connected directly to it. The main disadvantage is in the elaborate scaling. If a controller with four screen outputs has been chosen, then the expansion to more screens can only take place with another controller.

#### **Distribution of Image Information**

Besides that, the controller is able to distribute information to the individual screens, in any form. Scaling, turning, and mirroring of the picture are standards of the possibilities. The controller considers the side of the frame and calculates the bezels automatically. Therefore, chosen could be the Clone Mode, where all displays show the same picture, or Multi-Display Mode, where one picture is divided into all screens.

#### **The Connections**

There are three standardized connectors. DVI, HDMI, and DisplayPort. There are usually one input and multiple output channels. In addition, the controllers can also bridge a connection of several information sources with the video wall. The Digital Signage player is connected to the input. The input quality can be calculated up or down, thanks to the controller.



#### **The Length Decides**

The cable length can influence the transmission quality. As a result, controllers often have the option of amplifying the signal for long cable runs, thus avoiding a loss of quality. In general, such a function is useful from a distance of more than ten meters between screen and controller.

When installing larger video walls with a lot of displays, several controllers can be cascaded. Even the bonding of HTML 5 content and live broadcasts can be administered live. If needed, the video wall can be divided into separate sections, which then are able to display different content.

#### **The Scaler**

Traditionally, scalers were meant to distribute the input signal to a specific number of displays. However, by now, there are variations that allow multiple information sources. The contents are able to be transferred parallel to the connected screens. With this scaler, a maximum resolution of 4K is possible, which should be plenty for the most common requirements. scalers are particularly suitable for installations with the classic assembly, for example, the 4x4 or 6x3 arrangement.

As soon as another form is chosen, the controller should be used, because it can calculate the unusual arrangement more accurately. Scalers can be connected in series to the controllers in order to manage a video wall with many screens. In comparison to a controller, the scaler is the more affordable choice but is only considered, as stated, in classic assemblies.



#### **Cable Solutions**

The ongoing development of the screens results in video walls being able to perform imposing contents with a resolution of up to 4K. In order for the detailed pictures to be reproduced in large format, all components of the video wall must be equipped accordingly: this also applies to the wiring.

The cables are an important link because they are the point of intersection of the input- and output mediums. In order for the volume of data to transmit without lack of quality, a repeater should be connected if requiring a distance of more than ten meters. This will make for a stronger signal and enables a brilliant picture on the video wall.

#### DVI

Originally, the data was transmitted through Digital Video Interface (DVI). Since this technology was not able to distribute sound or large amounts of data, the connection for video walls is only recommended to a limited extent. Especially for content in HD or UHD, it is recommended to use the plug-in connection - for today's standards, DVI is no longer up-to-date.



#### HDMI or HDMI 2.0

In 2002 the interface HDMI (High Definition Multimedia Interface) hit the market. With this plug copyrighted, high-resolution AV-content was able to be transmitted. The data with a maximum resolution of 4K are transmitted at a speed of 30 pictures per second, thanks to the HDMI. This value ensures a liquid image display.

If the installation, as well as the content concept, require fast movements in the picture, HDMI 2.0 is the more appropriate choice. This revised HDMI version makes it possible for a player to transmit information to the screens at a speed of up to 60 pictures a second. 24 fps is enough for moving pictures to be considered fluid, but 60 fps provide an even more intensive picture experience.

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## IF YOU LIKE TO SEE IT FOR YOURSELF CHECK OUT THIS SELFTEST

frames-per-second.appspot.com

#### **Multifaceted Color Transmission**

In addition to the transmission speed, the higher color information provides detailed images. Instead of the previous 8 bit, the HDMI 2.0 transports 12 bit. Through this change, the color deepness is increased to 67.7 billion. Even if the human eye can't exactly perceive these nuances, this top offer stimulates the receptors of the viewer. As a result, the images become more vivid and their representation achieves particular attention.

#### **DisplayPort**

DisplayPorts are the youngest of the possible connectors. Due to the rapidly advancing development, the third cable generation is currently available with DisplayPort 1.3. With this connector, data of 4K to 8K are able to be transmitted. Additionally, this bridge is also suitable for video walls. A click mechanism prevents the connector from slipping out of the fixture. This ensures the firm anchoring during the assembly or conversion of the wall. In addition, this variant scores in terms of distance. Without suffering a loss of quality, DisplayPorts overcome a distance of up to 15 meters. **That's 30% more than with an HDMI cable can be gained in width.** 

#### SuperMHL - The Future?

However, there is already a new opponent in the starting holes. 2018 SuperMHL will launch on the market. This cable is a plug that has the same connector on both sides. The distinctive feature is planned to be the transmission rate of 120 pictures per second. That is nearly 10 times the data volume that the HDMI 2.0 can do. It is the first cable where 8K is considered standard transmittal. Additionally, SuperMHL is supposed to transmit electricity. The rumor is up to 40 watts.

The plug connection with 32 ends also provides a new color experience, the so-called "deep color". As a result, particularly realistic color shades are predicted, which are to be fully effective in shadows and light reflections.



#### **Information Transmittal**

Scaler and connector are the classic distributors of the picture information. In addition, there is also the possibility to transfer content via simple cabling from the player to the screens. This method is called daisy chain. This name describes the chaining of screens that are behind each other. Hereby, the first device is in direct connection to the information carrier. From there, the following monitors are connected in a row. This way, the signal is transferred from one display to the next and the information is transferred to the individual displays. This technical transfer is quick. That is why this variation is so popular amongst video wall installations. But there are risks. If one of the devices fails, then the information transmittal is stopped and the following devices have a black screen - a condition that should not happen with video walls. In order for this scenario not to take place, the development is working on an interesting alternative: Display as a service.

#### Display as a Service (DaaS)

Instead of the classic plug-in connection, a physical arrangement is made via IP addresses in a network. The special feature: The size and resolution of the screens do not matter, as long as the module includes an internet connection. This opens up entirely new possibilities, especially with regard to the optical construction of a video wall. For example, installations with various sized monitors from different manufacturers can be implemented. Besides the regular screens, theoretically, devices such as tablets or cell phones could also be integrated into these installations.

The display can be changed in real time on the screens. Individual elements can be removed and others can be added. The position of each individual device is precisely determined and bezel widths are automatically calculated with the help of the software. That way, the video wall can receive information from different sources simultaneously. This development promises dynamics and could leave the classic 1 to 1 cable connection behind.



Since every installation has its' own challenges in front of it, the costs are not easily generalized. Additionally, there are large ranges in price in the separate components. Therefore, the following numbers are only meant to be used as orientation assistance. Not just the acquisition cost, but the operating cost can vary also. The choice of the screens can brighten the first light in the tunnel. Differences in the electricity needed and the operating life of the device depend on the manufacturer and the technology of the device.

#### **Small to Medium Video Walls**

A small video wall, 2 to 4 monitors, can be purchased in a complete set from \$5,400 moving upward. Depending on quality and number of monitors, this purchasing price will rise. If the wall should be built from LED panels, the price depends on the pixel density. As a rule of thumb the following is used as orientation: **The shorter the distance of the viewer to the video wall, the more expensive are the individual panels.** Calculations take place in square meters. For the indoor –as well as outdoor area prices start at \$2000/m<sup>2</sup>.

A large format display lies in the area of 10,800 to \$54,000, depending on the size of the screens. Besides the displays, costs such as cables, player, and mounting come into play. Besides that, at least \$2,700 should be calculated for a wall with four screens.

#### Large Installations

Large installations often rise in price into the six digit area. Besides the hardware components, specialists, such as structural engineers, have to be involved in large projects. Besides the purchase price, the operating costs (total Cost of Ownership TCO) need to also be considered. Especially the electricity needed is a variable cost and the correct choice of screens can mean to have potential to save. Additionally, the cost of periodic calibration of the video wall should be considered.



# **5**. Conclusion

An installation of a video wall describes an extensive project. The planning of this project wants to be structured right. With this, the choice of the screens plays an essential role and should be viewed from all sides. For the success of the video wall, the following questions should be answered:

- Where is the video wall located inside or outside?
- How big will the video wall need to be?
- ✓ Should it be operated continuously?
- How large is the viewing distance?

If all of the important questions have been answered, a solution can be found. It is recommended to use service people. Thanks to the specialists, this realization should be flawless. It is also recommended to ask for several offers, in order to have a better overview of the cost.

- ✓ How high is the budget available?
- ✓ What kind of content will be displayed?
- ✓ How can the installation be mounted?

We wish for a successful project and hope to have answered some questions that may arise with this document. We look forward to any feedback that you may have. Please use email:

#### info@viewneo.com







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#### Editor

Adversign Media GmbH Immermannstraße 12 40210 Düsseldorf

+49 (0)211 355814-0 www.adversign-media.de

Author

Claus Hombrecher claus.hombrecher@adversign-media.de

**Graphics Ruben Wellinger** ruben.wellinger@adversign-media.de

