



White Paper:

The Evolution of Digital Signage

How Advances in Visual Display Technology Are Benefiting a Wide Range of Industries

INTRODUCTION: THE POWER OF VISUAL DISPLAY

In a visual age digital signage has become a key way to engage, inform and entertain in nearly every place people congregate, from lobbies and schools, to grocery stores and cruise ships, to doctor's waiting areas and corporate meeting rooms.

The global market for digital signage is booming and on path to hit \$20 billion in 2020, according to a 2014 study by Grand View Research Inc.

The reason for the rapid growth is clear — digital signage gives organizations the ability to send targeted messages to the precise place at the precise moment that people want the information. It's also more engaging than static signs. A 2013 study by Intel and Ontario Lottery & Gaming showed that dynamic displays generate 2–5 times the impressions as static signs. In the Signage & Professional

Displays Market Tracker Report, an April 2012 survey by technology market intelligence firm iSuppli, adults said that digital signage catches their eye even more than billboards, magazines, TV, the Internet or radio. And the majority of people declared that digital signage was more unique and interesting than

those other types of media. The popularity of digital signage is growing in tandem with technology improvements, which are resulting in displays that are more functional and flexible and provide crisper images. And these improvements are coming as the cost of the devices drop. This paper will look at the



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– iSuppli Survey, 2012 –

advances in digital signage, as well as innovative ways in which different industries are deploying it to stand out from competitors, drive sales and satisfy customers.

INNOVATIONS DRIVE DOWN COSTS

Mitchell Auerbach, vice president of operations/director of LCD solutions at Edge Electronics, an electronic components distributor that makes visual display solutions, explains that the first generation of digital signage was flawed, in that the solutions often used non-commercial-grade television sets connected to DVR players.

“People couldn’t understand why the solutions were breaking down every three to five months, but it wasn’t designed for commercial purposes,” he says. “The new technology is developed with digital signage in mind, and also media players, which are ruggedized DVRs. So the whole display is meant to run constantly for a much longer period of time.”

Today’s displays

In addition to these improvements, Auerbach says there has been a significant movement to drive down the cost of visual displays. For example, the original visual displays used cold cathode fluorescent lamps (CCFLs) for backlighting. Backlighting refers to the light that projects from the back of the device to illuminate the image. The CCFL method was cheap but did not use power efficiently. And power usage was the most expensive and often overlooked element in the long-term costs of visual displays. CCFLs were also bulky because the units housed both lamps and a reflector, which limited where and how visual displays with CCFLs could be used.

Today’s visual displays incorporate light-emitting diode (LED) backlit technology. LEDs, unlike CCFLs, have no light filaments that will eventually burn out, and the panels don’t get particularly hot. LEDs are illuminated when electrons move in semiconductor material. They have all sorts of applications — they form the numbers on digital clocks, alert you when appliances are turned on and, when collected together, form images on jumbo television screens. The LEDs provide the illumination for the liquid crystal display (LCD), which is the flat panel or video display that shows the image.

A MORE EFFICIENT LIGHT SOURCE

LEDs produce significantly more light per watt than a traditional light bulb. Because of this, these new displays deliver uniform brightness levels while using only 30 to 50 percent less power than CCFLs, lowering costs and also reducing carbon emissions.

At the same time, these technology advances allow smoother scrolling and reduced motion blur in digital signage messaging, which

are increasingly important considerations as visual displays are being deployed for ever more critical purposes: to drive sales and engage customers. The result is higher contrast ratio, which creates a better picture along with the energy savings. With native contrast ratios of up to 5,000:1, LED-lit LCD displays produce more realistic images, which heightens their impact. Leveraging these quality improvements, Northwestern

College deployed LED-lit displays throughout a new community center to inform students, faculty and guests of the latest information and events. The energy-saving displays deliver rich content and information, and help the college limit its impact on the environment.

Quality meshes with size

The improvement in quality is growing in tandem with the size of the displays.

“For smaller screens, like a screen near a supermarket cash register that is promoting an impulse buy, we are seeing more concern about price than quality,” Auerbach says. “For the larger screens at airports and restaurants, we are finding a much higher demand for quality.” He believes this will intensify if the federal government requires digital signs in large public areas to meet the standards of the Americans with Disabilities Act. (The Act’s regulations limit the distance digital signage can protrude from a wall, making the thickness of a display an important consideration and further increasing the appeal of slim LED-backlit panels.)

The recent developments in visual display solutions not only offer superior image quality but also the flexibility to work in almost any environment and manner in

which they are needed. Auerbach notes that many businesses are expanding the way they use digital signage. “Some airports now have hundreds of 55-inch monitors, and they’re not just using them to show information about arrivals and departures,” he says. In London’s Heathrow Airport, for example, video monitors along the wall at one of the escalators showcase art. “It just shows you the kind of impact you can have with digital signage — it can be used in very modern ways as a design choice.”

And they’re using the signage to improve their return on investment (ROI). For example, Las Vegas’ McCarran International Airport features a 100-screen video wall at the airport’s D Concourse rotunda. The ultra-thin bezel around each monitor gives the appearance that the tiled formation is one

solid piece. The giant display, which measures 33 feet by 19 feet, is one of the largest video walls in a U.S. airport.

“McCarran is one of the most technologically driven airports in the aviation industry,” said Director of Aviation Randall Walker. “We’re at it again with this landmark digital video wall. Its eye-catching stature allows the airport and advertisers to speak to travelers from all corners of the world and also presents a unique opportunity to increase revenue.” It has been estimated that the video walls will produce an additional \$500,000 to \$1 million in gross advertising revenue for the airport each year.

Let’s consider some of the innovative ways that companies are using visual display stations for public displays, commercial displays and corporate displays.



PUBLIC DISPLAYS

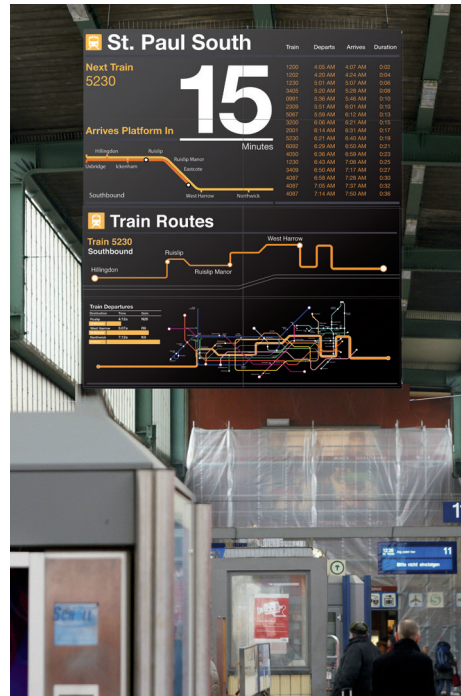
Museums, libraries, churches and lobby receptions are turning to digital signage to provide up-to-date information in an efficient and entertaining way.

Hotel operators, for example, are using visual displays as a “digital concierge” for guests, helping them find their way through the property, see menus for on-property restaurants, learn about the weather or flight delays or keep informed about events.

As the technology improves, hotels and other establishments are finding ever more creative ways to use the displays. For example, at one Las Vegas hotel chefs prepare appetizers, entrees and desserts in a series of live cooking demonstrations, which are then broadcast on a large display to entertain and educate guests.

Other establishments seek outdoor engagement. Rugged, weather-resistant outdoor displays can transform the public broadcast of information. With

bright and highly visible display configurations, establishments ranging from outdoor advertisers to municipalities to universities can deliver engaging content and messages in optimal locations.



Signage as a focal point

One swank new hotel on the Las Vegas Strip has made the public displays in its lobby a signature

attraction. The design uses 24 screens on the wall behind the front desk. Another 400 ultra-thin bezel screens wrap around eight four-sided columns. The ultra-thin bezel can be a third or more lighter than traditional CCFL-backlit displays, making them easier to install. The lighter weight also eliminates the need for companies to get their walls reinforced in order to sustain the weight of the screen, making it possible to place screens in more locations than was previously possible.

The impressive column displays at the hotel are behind sheets of protective mirrored glass, adding not only a visual element but an easily accessible maintenance portal. Guests roaming through the lobby are taken aback by the mesmerizing images that rotate on the many screens, from simple geometric shapes to brilliant underwater landscapes and pristine snow falling in a forest.

COMMERCIAL DISPLAYS

Supermarkets, small food and beverage restaurants, real estate shops and food courts are all using digital signage to generate sales and spur impulse purchases. Since visual displays are a “place-based” medium, the signs and messages can be easily tied to their target

audience. A sporting goods store has a clear idea of what kind of information visitors want; a restaurant knows that anyone who comes through the door has food on his or her mind.

Retailers have found innovative ways to integrate visual displays

with other technology trends, such as social media and crowd sourcing, which is the process of turning to an entire customer base to create new products and services. For instance, 4food, a New York City eatery, invites customers to create and name their customized burgers and

then earn a royalty when other people order their creation. The restaurant attracts attention with a visual display that contains the “BuildBoard Chart” of the top-10 ordered burgers created by customers and the “Trending Burgers” table of most recently purchased and branded burger creations.

Meanwhile, Starplex Cinemas greets customers at its luxury destination movie theater in New Jersey with a highly engaging video wall comprising three 75-inch Samsung Smart Signage displays. While waiting in the lobby, customers can purchase tickets for future movies on interactive digital movie posters or browse the dynamic menu boards at the concession stand.

The next evolution of digital signs will use predictive analytics, which is technology that can identify data patterns that will drive sales and instantly put a message on a digital sign in response to changing conditions. For example, a restaurant that finds itself overstocked on some

foods could reduce spoilage by reducing the price on those items, or a retailer could push umbrellas by announcing on its sign that rain is forecasted for the following day.

Video display ROI

These are just some examples of how technology advances are being leveraged to boost the ROI of visual displays. In

CEO of Watchfire Signs, a company that makes LED digital signs for industries ranging from car washes to banks to funeral homes.

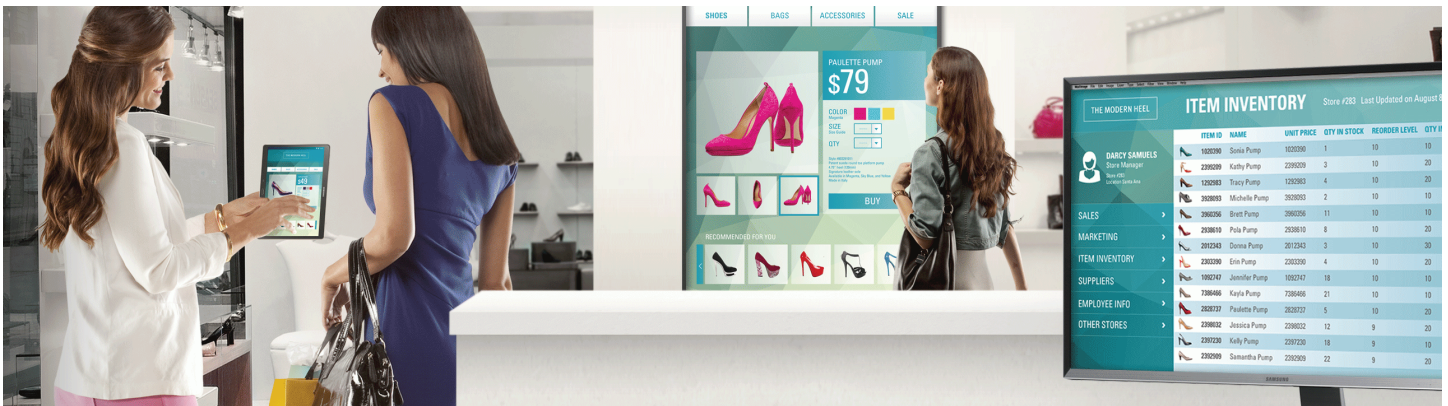
He says the ability of visual displays to provide immediate information is causing companies to shift some of their marketing budgets to them. An auto dealer, for example, can change the messages on its screen,

“The growth in digital signs is being paired with what’s happening in the broader world, where people want to communicate everything instantly.”
 – Steven Harriott, Watchfire Signs –

retail environments, customers can use their smartphones to interact with digital signs to get coupons, product information or product reviews.

“Digital signs allow you to talk directly to the wallets that are passing by every day,” says Steven Harriott, president and

minute by minute, as its inventory changes. In contrast, a car featured in a newspaper ad might be sold by the time the ad runs. “The growth in digital signs is being paired with what’s happening in the broader world, where people want to communicate everything instantly.”



CORPORATE DISPLAYS

Hotel/leisure centers, seminar/meeting rooms, cruise ships and financial exchanges are some of the industries that have embraced digital signage as a more effective way to keep customers and workers up to date.

Advancements in such areas as video-display resolution and the arrival of large-format displays, such as LCD, have enhanced the effectiveness of video walls and are expanding the scope of experiences offered on video walls. Auerbach says, "It's amazing how fast companies are adopting the 55-inch monitor with the super-thin bezels for use in the video walls of their conference rooms." He worked with one international company that combined eight separate 55-inch panels for this purpose.

Sources for continuous information streams

Royal Caribbean implemented a digital signage system throughout its fleet, including in the world's largest cruise ship, Oasis of the Seas. Stood on its end, this huge vessel would be nearly as tall as the Empire State Building. Some 150 LCD screens are located throughout major passenger-

traffic areas of the ship, providing continuous messages about guest services, sailing events, production show times and shore excursion activities. The interactive display system is composed of three dozen 46-inch LED screens, as well as eight horizontal screens installed at specific points throughout the ship.

The dining room display provides passengers with a list of on-ship eating places, their locations and an indication of how long it will take to be seated at that particular dining space. The graphic on the screen resembles a thermometer, which is color coded by red, yellow or green to provide a distinct idea of the wait time.

Even the Port Everglades, Florida terminal that was built to dock the mammoth Oasis of the Seas is outfitted with 192 LCD LFD displays, running Samsung's software to provide passenger embarkation and debarkation instructions.

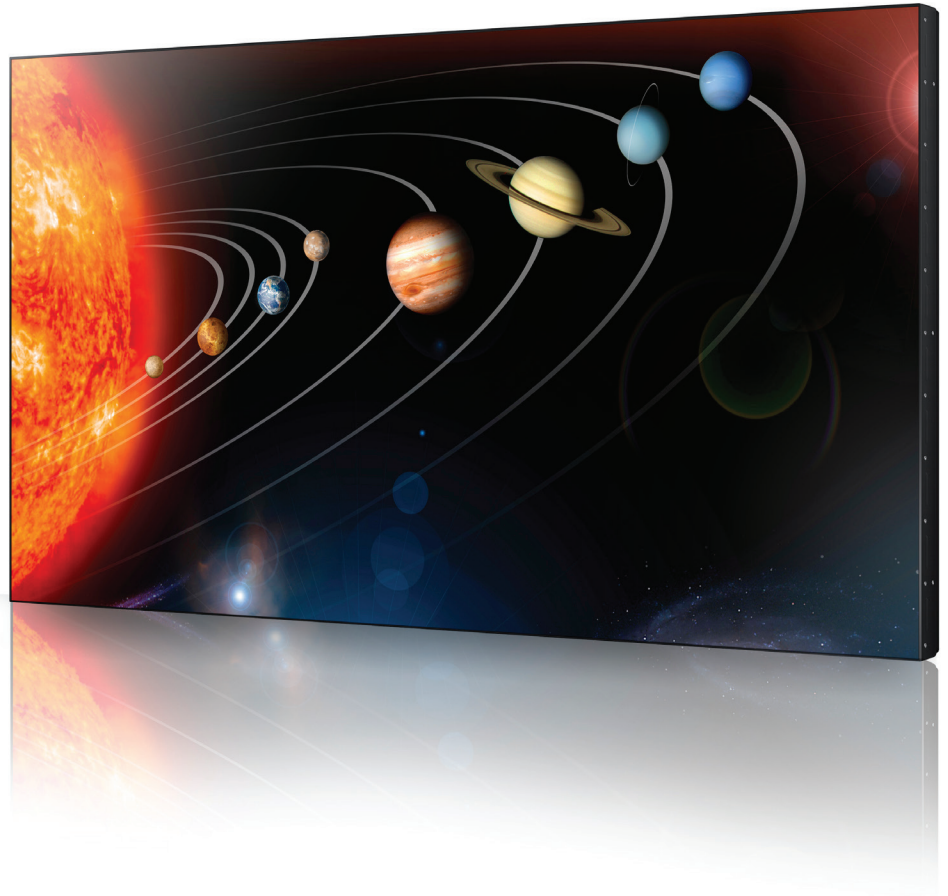
Royal Caribbean was so happy with the interactive screen results that the screens became a strategic competing feature in how it marketed its cruise line offerings. "As for the passengers,

they just love it," according to Heath Burr, a program manager on the Royal Caribbean project. "It was the number-one rated ship feature with the highest number of positive feedback comments."

Clearly the uses of visual displays are growing in tandem with their impact. One reason, of course, is the lower cost of the technology, which puts digital signage in the price range of virtually any type of business. Another reason for the explosion of digital signage is the advances in technology that make its application appropriate for so many uses, ultimately satisfying the varied needs of customers in an increasingly wide range of venues. Digital signage allows unparalleled opportunities for creativity and innovation while it informs and entertains. As our communications become ever more visual, this technology will continue to expand and become a competitive advantage for many companies and a business imperative for others.

ENABLING INNOVATION IN DIGITAL SIGNAGE

Samsung's lineup offers digital signage solutions to fit a range of budgetary and creative needs. The D Series displays, for example, feature direct-lit LED technology that provides a slimmer, more energy-efficient design. With a narrow form factor combined with enhanced System-on-Chip (SoC) technology, the displays deliver highly engaging touch-screen and video wall configurations, which you can now see at national retailers and major sporting venues. The basic DB Series features SMART Signage Platform (SSP) technology; the DM Series displays offer the most options and 24/7 operation; and the premium DH Series provides 700 nit brightness. The features include:



- **Enhanced SSP SoC Performance with Quad Core Processor:**

SSP provides the powerful streamlined solution of an integrated, open platform that lowers hardware installation and operating costs.

- **More robust graphics:**

D Series displays support more robust graphics and the ability to display two full HD videos simultaneously.

- **Embedded video player:**

The SSP with embedded video player enables you to reduce total cost of ownership (TCO) up to 30 percent, according to an analysis comparing traditional digital signage deployments.

- **Open platform with software development kit (SDK):**

The open platform and SDK facilitate software development and allow you to acquire innovative

digital signage content management software from U.S. partner developers.

- **Touch screens:**

The Quad Core processor enables you to run touch screen apps directly to 32-inch to 75-inch displays. Users can connect the touch overlay directly to the panel via USB, eliminating the need for an external PC.

In terms of spurring creativity regarding the installation of video walls, Samsung's UD55D is a 55-inch display offering ultra-narrow bezel widths for a virtually seamless installation. The UD55D provides endless flexibility for installations that are only limited by the imagination of the user.

For signage in high-ambient light environments, Samsung's OMD Series delivers easily readable text and bright graphics. They feature all-weather durability — when installed in a customized housing — and the ability to manage content without external devices.

Samsung offers a commercial display solution for nearly any use. Choose from LED-backlit displays, touch screen displays, video wall displays, outdoor displays and more. Learn more about all of Samsung signage solutions.



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