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Digital signage - entering the personalized and interactive era

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LG “Best In Class” Ultra HD Multi-Touch Signage Source: http://www.lg.com/us/commercial/touch-displays/lg-84WT70PS-B)

The Digital Signage Expo was recently held in Las Vegas. LG, being one of the global players investing strongly in display technology, was one of the largest exhibitors. New solutions and cutting-edge display technology made especially for digital signage was presented, such as paper-thin dual-sided LED panels[1].

In recent years, digital signage has quietly started to enter into our day-to-day lives – digital signs inside buses and metros capture our attention while commuting; supermarket aisles are filled with small screens that play ads as we pass; airport arrival and departure signs are now all digital, and the expansion of digital signage is also starting to reach our street billboards in some areas. This gradual change, together with new wireless and sensor technology applications, is producing new opportunities in many areas — notably the advertising industry. As IoT develops further, we can expect rapid development in digital signage to continue; we will enter a new increasingly personalized and interactive era. In this blog, we look at digital signage and the changes this technology is about to cause.

The driving forces behind signs going digital

Digital screens are entering sign space rapidly, driven by pull from demand, and push from supply. Dynamic (as opposed to static) signs capture the audience's attention in a more effective way[2], making it a more attractive option for advertisers (demand pull). The initial step was billboards with rolling canvas, and digital is a natural next step. The digital display has been going through accelerated technological breakthroughs in the past few years, partially as a by-product of the smartphone and large-screen TV revolution[3]. This technological advancement has trickled down to digital signage; as the price for large digital display screens has gone down, replacing traditional signs with digital has become viable.

The main implication of signage becoming digital is the flexibility in managing the sign content. In the past changing signage was a very manual process of dismantling and reinstalling physical canvases or printed paper. With digital signs, changing advertisements becomes as simple as clicking on a mouse or tapping on your smartphone. Video and multiple ads on one sign are possible, as well as varying display times. Sign owners can provide an agile platform to advertisers and advertisements can also be iteratively developed in real time, depending on customer reactions and feedback. Going one step further, digital signage is incorporating interactive aspects using sensor technology (such as proximity) to grab the viewers' attention even more effectively. This sensor technology also provides new ways in measuring audience response in real time.

Digital signage use cases can be largely categorized into a few different use cases and business models:

1. *Single-brand stores*: Single-brand stores like Nike, or even individual Coca-Cola vending machines utilize digital signage to entice and engage customers in a more interactive and flexible way than traditional print advertising does. Their goal is to entice customers into the retail space and generate demand.
2. *Multi-brand retailers:* On the other hand, multi-brand retailers such as supermarkets or outlets, utilize digital signage as ad space which they can sell to suppliers to promote their brands within the store. The goal is to maximize revenue through providing promotional spaces and tools for their suppliers.
3. *Ad networks:* Companies specializing in selling ad space are jumping into digital signage by setting up digital signs in public areas and switching out traditional billboards and poster space with digital signs, since it provides better Return on Investment (ROI) than traditional print advertising. Comparing New York City's Times Square in the 1990s versus now shows how much digital signage has replaced more traditional signage methods[4].
4. *Transportation providers:* Digital signage in transit venues such as airports, train stations, subways, or on highways, typically provide practical information for travel. One of the main examples are the arrival/departure boards at airports or traffic/weather information on expressways. There is also the possibility of this functioning as a fast communication channel in emergency situations. Transportation systems usually are spread out in a wide area, making digital signage useful for situations that need immediate distribution of information. While the main goal is information communication, digital signage at these spaces can also be used as ad space or entertainment.

5. *Point of wait venues:* Lastly, digital signage in waiting areas such as hospitals, hotels, or office lobbies, provide practical information (such as meeting room schedules or the weather) or create a welcoming ambiance. As the goal of this digital signage is more for entertainment than advertising or information providing like the others, the need to actively rotate and refresh the content is lower than the rest.

New technology players re-writing the rules

Digitization of signage also means the value chain of signage is rapidly changing, with digital hardware and software contenders entering. Figure 1 illustrates the new value chain and players.



Figure 1. Digital signage value chain

Signage hardware providers include display vendors, media player vendors, and other signage hardware vendors. These players are competing with traditional signage through crisp display technology. One of the latest display technologies relevant to digital signage is OLED (Organic Light-Emitting Diode), which provides the possibility of paper-thin curving displays to accommodate a variety of spaces. OLED also has a wider viewing angle compared to past technologies and improved brightness so it is comfortably viewable in direct sunlight. This is a big advantage especially for outdoor signage, which needs to be viewable in varied light situations. The challenge for hardware players in digital signage is making the devices weatherproof and durable (especially for outdoor signs), low maintenance, and lightweight. After all, many of these digital signs are aiming to replace the physical space that was once occupied by paper or canvas.

Software development for signage is a new area for the signage industry, and is proving to be a challenging development area for software developers. Digital signage requires rapid iteration cycles of its content to make it effective. For this to be possible, all systems must be integrated to work properly – this sometimes means connecting separate screens and digital signs into one network so it is manageable from one location. There also are management software, playback software, and content creation software that have to work together to bring the right content at the right time to the right location. The key here is that software should support interoperability and flexibility; interoperability so that the signage owner can integrate different hardware from different manufacturers into one system, and flexibility so that the owner can change content whenever and however he/she would like to.

Based on the platform supplied by hardware and software, content is curated, presented, and iterated. This is the most important part of the value chain, since it is how the added value of digital signage is captured. Content creators must learn how to utilize animated features to communicate the message in a more effective way than static signs. This is especially true for a category of digital signage called “Digital Out of Home” (DOOH) advertisement[5]. For online ads, there are well-established methodologies on how to find the exact right mix of content to grab the most attention. For example, many online ads adopt A/B testing to optimize brand exposure and click rates[6]. With digital signage, the same can and will be

adopted further for physical signs as well as the cost of switching has been reduced to close to zero. Content managers can test different content types and fine-tune the message based on the feedback and results.

If switching traditional printed signs with digital signs was the first wave of the digital signage revolution, the second upcoming revolution is digital signage's marriage with sensors. As the goal of digital signage is oftentimes to enhance sales or advertise something, it is important to measure the effectiveness of a message. For this sensors play an important role in two ways – measuring engagement metrics and providing interactivity. First, sensors can measure the level of engagement induced by digital signage. This could be done by simple traffic counters or video recognition systems that track exposure, attention given, proximity, and dwell time[7]. Second, certain sensors also provide an aspect of interactivity with digital signs, making the experience more engaging. A good example is Los Angeles International Airport, which has a 19,000 square-foot digital screen that are interactive to travelers' movements[8]. Interactivity greatly enhances the chances of full customer engagement, thus making the message more effective than static signs. A great example of this was a marketing event by Coca Cola, which used interactive digital signage to grab bystanders' attention and engage them in a "dance challenge" to promote their brand[9].

In the future, digital signage will be further integrated into the Internet of Things (IoT), enabling signs to show us exactly what we are interested in by providing customized information. The movie Minority Report demonstrates how this future could look like (although it is more likely that the biometric data-reading technology from the movie would be replaced with Bluetooth connection to our mobile devices)[10]. There are already some partnerships between digital signage and tracking sensor companies that aim to make personalized signage a reality[11]. For example, beacon company Gimbal and digital signage company Nanolumens came together in a partnership recently to provide better targeted advertisement solutions – they collect consumer information through beacon technology, and display the ad that is tailored to the aggregated sum of bystanders[12].

Predicting a future of personal and interactive signs

Currently the signage industry is still in the stage where they are rapidly replacing traditional signs with digital signs, as prices continue to drop. This means that there is still a window of opportunity to monetize on the hardware portion (display, media players and so on). As seen in the below Figure 2, display and media player revenue is expected to grow slowly but steadily. However the growth is moving on to software maintenance for enabling better quality content and connectivity for fast cycles of media content curation. According to HIS research, software revenue had its strongest growth in 2014, increasing 21% from the previous year to 431 million USD.

In the future, analytics and content curation service will be more accelerated and fast iterations will be done to find the right content that will provide the best ROI. Advancement and adoption of sensors in tandem with digital signs will play a big role in bringing this advancement to a reality. As digital signs turn to more connected solutions, expect to see more customized and engaging signage that utilizes tactics similar to online ads.



Figure 2. Digital signage market revenue forecast[13]

As signage become smarter and more like the online world we know today, the concern of privacy will soon raise its head. The portrayal of personalized signage in Minority Report may be a retailer's dream, but a consumer's nightmare. Players in this field have a careful path to tread on, but as it was for online and mobile, change will happen nonetheless. In something as simple as signs, there is a lot of innovation on-going, and we can expect continued development.

Further reading and references:

This blog is based on a broad range of articles and reports. Some of the more interesting ones are listed below.

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