BUSINESS CRITICAL

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YEARBOOK
DIGITAL SIGNAGE & DOOH
2022


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Dear Readers,

Since our last yearbook, much has happened – not only in the digital signage industry, but also in geo-politics and macro-economically. Covid turned the world upside down in 2020. Nobody would have thought that 2022 would bring a war, a looming recession and an energy crisis to Europe. Compared to that life was simple and happy in 2019.

As strategy and digital signage industry analysts, it is our job to analyze technological, ecological and economic developments of our industry. Since the pandemic, not only the digital signage industry, but the global economy in total is experiencing a massive, often painful transformation – with lasting impact for the future.

But our drive and our core values stay the same: invidis is committed in guiding the digital signage industry into the future with insights, analysis and visibility. We talk to the thought leaders, shapers and makers and search for trends that will help businesses to grow. This yearbook is the condensed result of the last 12-months journey – with a special focus on our digital signage trend of the year: business critical.

For many businesses, digital signage has become essential in their daily operations. We take a deep look at the requirements for software and hardware, and go even deeper in examining the needs of the most important verticals. Additionally, we have widend our coverage – for the first time invidis provides a snapshot of all major markets across EMEA and North America.

We're passionate in what we do since 2006 – providing the global digital signage industry with exclusive research and actionable insights. More than ever as we launched invidis impact – our operational consulting unit with experienced senior digital signage executives.

Florian Rotberg (l.) and Stefan Schieker

And in these challenging times, we enjoy meeting clients, colleagues, and friends again in person – at ISE in Barcelona and DSS Europe in Munich where we celebrate the resilience and optimism of our industry.

Yours

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Photo: imaculix AG

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Photo: Adrenorama

DIGITAL SIGNAGE IS VITAL

Screens Matter

From control rooms to factories: For a lot of applications, digital signage has become business critical. It means that the system has to perform under all circumstances – and can be fully integrated.

Stefan Schieker

Digital signage has come a long way in its 20+ years history. It all started with a couple of CRT-displays, later replaced by flatscreens, screwed to the wall to visually shout out marketing messages. Content was delivered on thumb drives or DVDs. For the first connected networks, the content was distributed by expensive corporate satellite connections in absence from broadband internet. At the beginning, the main purpose of the majority of digital signage touchpoints was for ambient purposes with rare content changes.

For key business processes, like checking in on airports, screens and digital signage systems become more and more business critical.

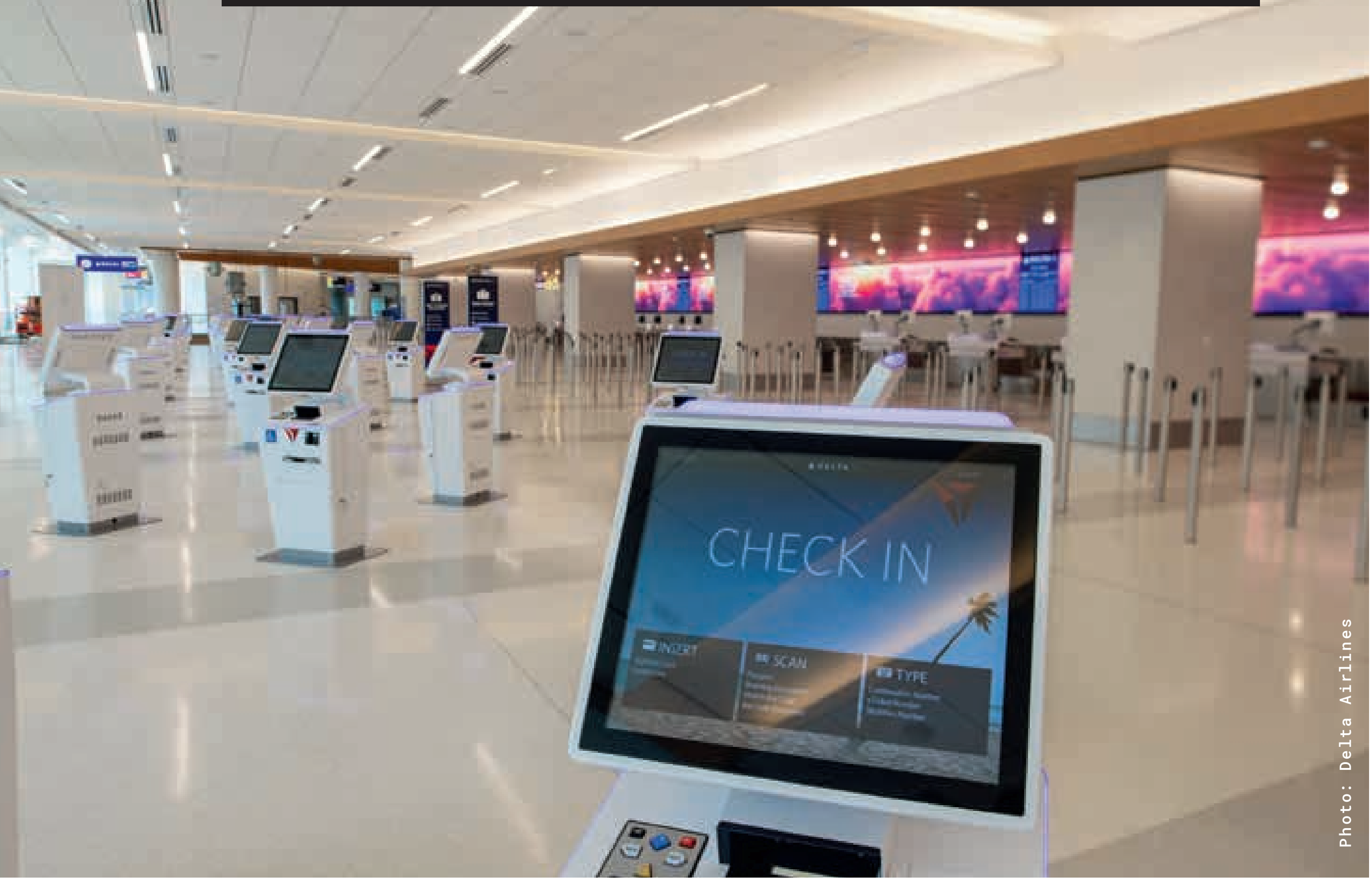
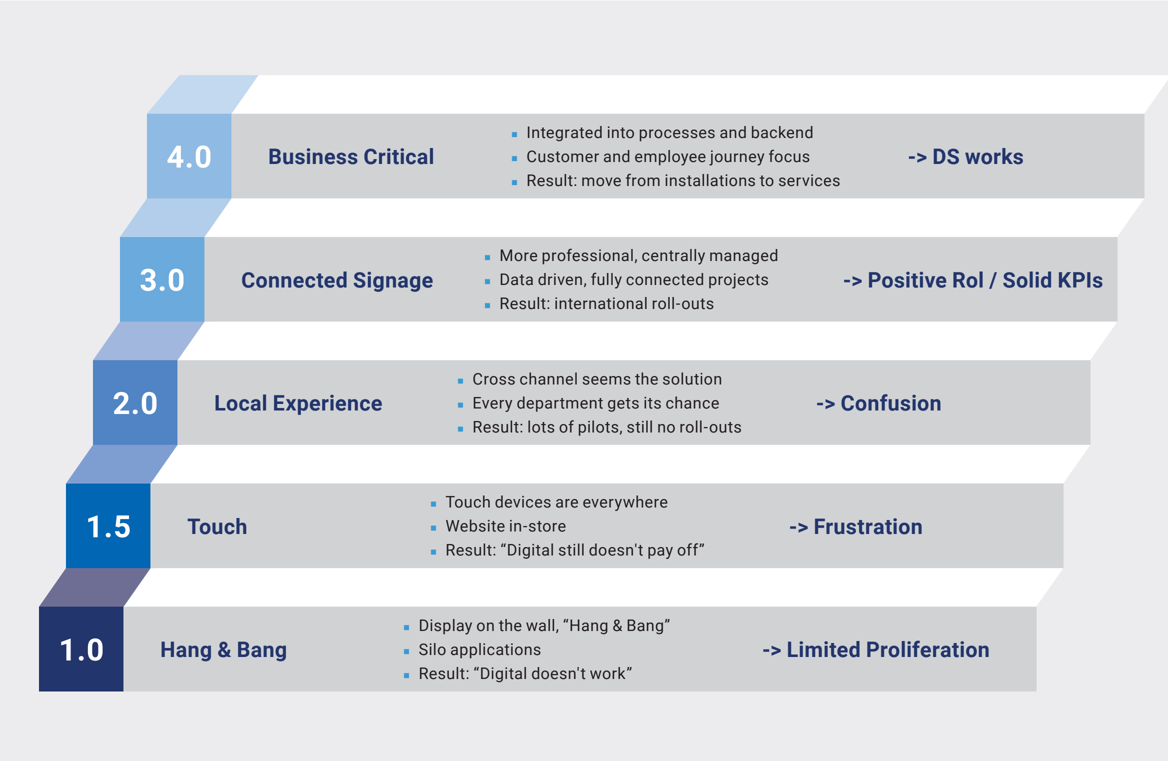


Photo: Delta Airlines



In the end there is business critical: The market history shows the stony steps to a fully integrated system. Source: invidis

Fast forward to today and we see complex networks of systems, remotely controlled with real time content delivered via the internet. All nicely integrated into furniture or interior design. Use cases have broadened from pure on-site marketing over communication displays or transaction kiosks all the way to fully immersive, interactive experiences. Nowadays there are hardly any technical restrictions left and only creativity – and budget – are the limit.

And digital signage is no longer limited to retail, but has conquered basically any public, semi-public or private space where people move or dwell. That can be places like offices, transportation, factories, hotels, bars or restaurants, trade shows, control rooms, museums, hospitals or schools.

In its latest evolution stage, more and more digital signage systems are becoming business critical. So, what separates a regular digital signage system from a Business Critical one? Very simple: When a business critical screen goes black, the site, no matter if it is a retail store, a factory, or an airport, has to shut down.

Take the example of McDonald's who had to close one of its Munich restaurants because the order terminals failed. London Gatwick airport was close to a complete shutdown when its flight information displays (FIDS) were cut off the internet. Employees had to use whiteboards and markers to keep operations running for about seven hours. A similar scenario hit the Teheran rail station when its passenger information system was attacked by hackers.

Business critical IT systems are nothing new per se. Just think about check-out systems in retail or manufacturing control systems. However, what is new is that more and more digital signage systems move from a silo application to business critical functions.

We typically differentiate between business critical touchpoints or systems, like for example FIDS systems or order terminals, and business critical functions, like for example airport evacuation warnings on advertising screens. In the latter case, the main purpose of the displays, displaying advertising, is not Business Critical. However, in case of an emergency, these displays play a crucial role for the airport security.

In some cases, especially DooH, a black screen has a direct impact on the business of the screen operator. If the display fails, the operator cannot earn money. In these circumstances, we talk about business case critical, but not business critical digital signage screens.

Five Components

In our view, there are five key components to create and to operate business critical digital signage solutions:

1. Vertical insights and process integration

2. Orchestration and DXPs

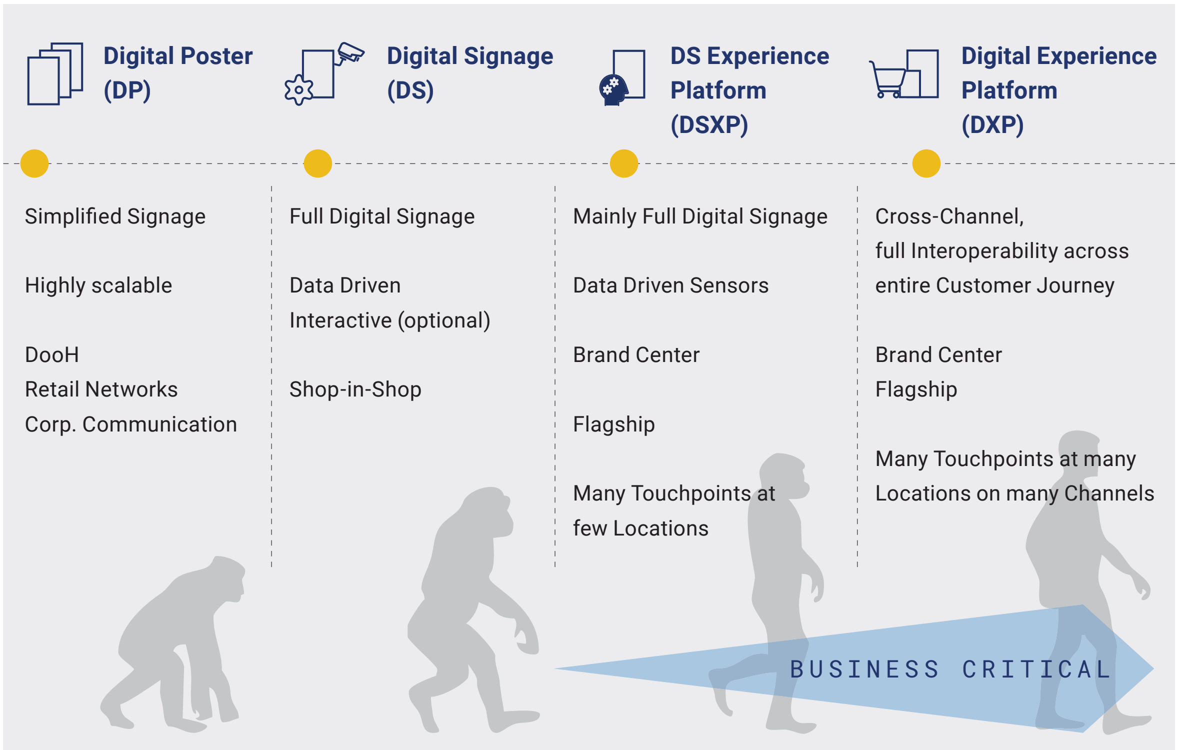
3. Data and backend integration

4. Data privacy and IT security

5. Remote management and operations

The first capability that is required to create business critical digital signage applications is a deep understanding of the respective industry vertical. As an integrator, you need to understand the key business drivers, like for example the role of the lobby and auxiliary revenues for cinema operators. Once you identified these key business model elements, there is a lot of work to do to understand your client's processes and to tailor a digital solution to enhance these practices.

Typically, there is a lot of resistance to change, and not all digital ideas are openly welcomed. In addition, established structures and ways of working make it sometimes difficult to "see" the enhancement potential of digital solutions. Often, this leads to bad compromises, and a lot of the benefits of digitizing processes are already lost in this early phase. As you might have noticed, we are talking about fundamental digital transformation in this stage and not only about digital signage. However, if digital signage takes over a critical function in the new digital process, it naturally becomes business critical.



The more complex the experience platform, the more vital it is for the customer's business. Source: invidis

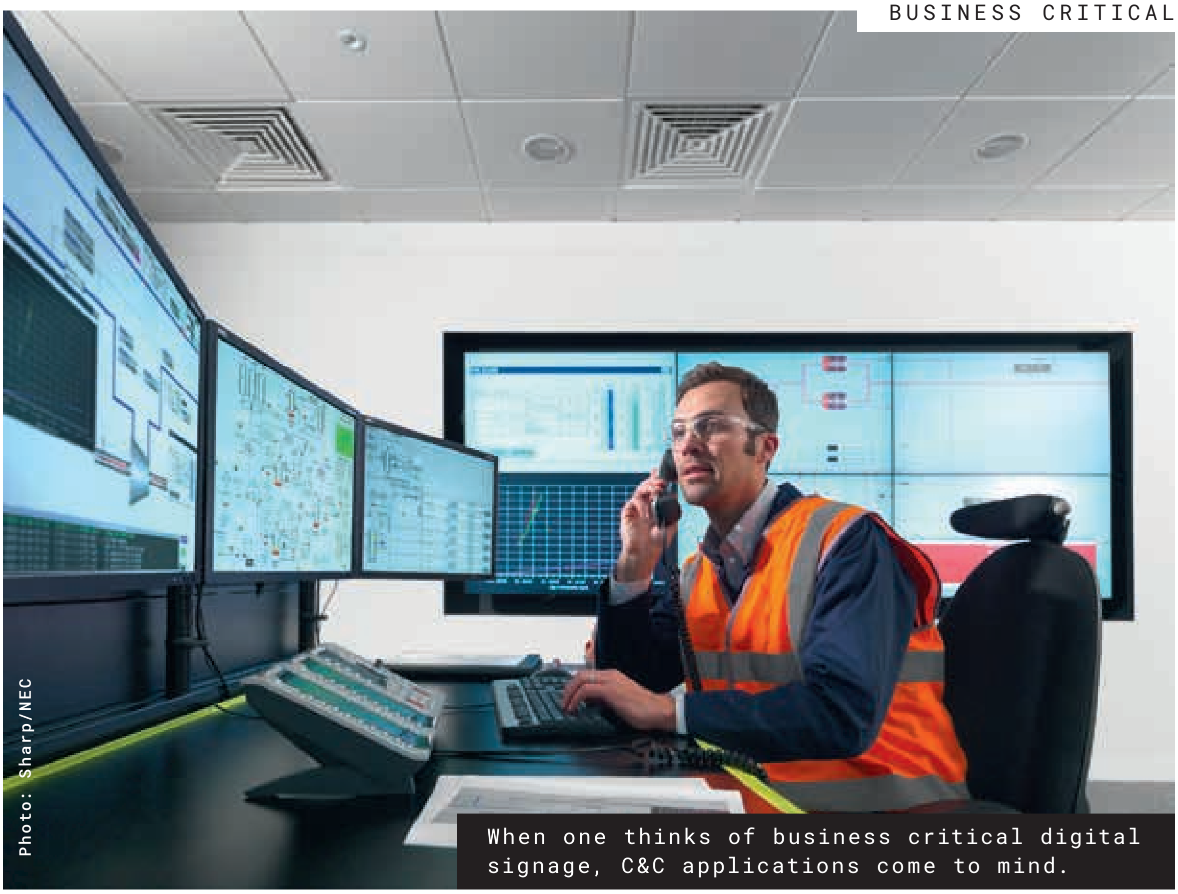


Photo: Sharp/NEC

When one thinks of business critical digital signage, C&C applications come to mind.

When the orchestra plays

Typically, digital signage, even in its business critical version, is only part of the total experience of users, customers or employees. Therefore, it is fundamental that all digital signage elements fit the overall digital journey. We typically call this orchestration. Because like in a real orchestra, you have to make sure that every element plays along perfectly with all other components of the experience. And not all of them need to be digital. Just think of the correct placement of digital screens in the architectural concept, or additional product information that does not distract from the physical product at the POS.

The ultimate goal is to create a unified platform to manage all digital interactions – a so-called Digital Experience Platform (DXP). However, at the time being there are very few DXPs that can handle digital signage. An opportunity for market players to combine all digital signage related interactions into a Digital Signage Experience Platform (DSXP) that can be linked to larger DXPs. With the integration of all digital signage touchpoints in a DSXP, it is very likely that at least one of these touchpoints is business critical, and therefore the full DSXP becomes business critical.

Moreover, with digital signage being an integral part of the overall experience concept it is a critical component. After all, you do not want to listen to an orchestra that is missing the string or the brass section.

Data is key

The key element that drives all business critical processes is data. And especially when we talk about business critical, data needs to be complete, precise, and timely. This data is typically handled in a business' core IT platforms like ERP systems, PIM platforms, order and payment handling systems or production and logistics control systems. And many companies already struggle to uphold the high data standards that are required in these core systems.

Most of today's digital signage solutions have no or little overlap with these kinds of systems – they still live in a silo or have unidirectional interfaces to receive some product or price data. In business critical digital signage solutions, flawless APIs are a core element. While some of the APIs may still be unidirectional – think for example of manufacturing KPI dashboards – most will be bidirectional to trigger or collect user interaction information.

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Photo: imaculix AG

Modern cinemas rely on digital signage as a business critical component.

APIs and integration with customer systems aren’t new per se for digital signage integrators or software providers. However, in modern installations the number and the requirements for the APIs are different. Just think about real time data exchange for AI functionalities or programmatic media sales, or near real time production data for manufacturing or product availability data in retail. Digital signage software platforms that are built with an API-first approach definitely have an advantage over older architectures with custom-built APIs in these cases.

In some projects, we have seen workarounds that simply replicated or even stored core data within the digital signage system. This is also a way to become business critical as a DS market player, but not the way it should be.

Safety First

With APIs to core business systems, data security becomes a must-have feature for digital signage software systems. Typically, customers require an ISO 27001 certification, and some add their own IT security and penetration tests.

On the digital signage software provider side, only very few companies like Signagelive or Intuiface have ISO 27001 certification as of today. And when we talk to integrators and software companies, they often tell us that it hasn’t been a requirement in many tenders in the past, but this is changing mainly in larger, more international tenders. Therefore, especially the larger providers are working on getting certified in order to stay competitive in these tenders, and to be able to win business critical digital signage projects.

But this is neither a fast nor a cheap task, and it depends a lot on the architecture of the software platform. For companies with modern, service-cloud-based architectures, ISO 27001 certification is much easier to obtain than for firms that carry a lot of legacy in their custom-coded platforms. For some it may even go as far as to completely redo their software architecture. An investment of typically several million Euros – but it might be a necessary one to be futureproof. On the other hand, this will leave many of the smaller software providers out of the game when it comes to business critical digital signage installations.

The other dimension related to data is privacy. Especially in business critical applications, more and more customer data is handled by digital signage systems, be it direct input, e.g., for transactions, loyalty programs or service requests, or data collected by sensors that is not anonymized directly on device. In all these cases, data privacy rules must be observed. Unfortunately, there is no global data privacy standard, but GDPR generally gives a good guideline. However, local conditions have to be checked for each installation country – as not only laws and regulations are different, but consumer acceptance can vary greatly.

Full Remote Capability

Business critical solutions should not fail. And if they do, you have very little time to fix them. Where we talk about days with traditional digital signage installations, we are down to reaction times of hours or minutes for business critical installations. Therefore, there are two critical components to achieve the required performance: system design as well as network and service operations.

Designing failure-proof digital signage systems should be a core capability of digital signage integrators, as it requires a combination of hardware and software engineering and a lot of experience of what can go wrong. Any system failure can get extremely costly, not only for on-site service interventions, but for the impact on the customer's business. Just imagine the cost of an airport shutdown or the lost revenue for a retailer when a store needs to close. Therefore, failures must be avoided almost at any cost. This also includes concepts like preventive maintenance.

However, if a failure occurs, it has to be spotted instantaneously and, in most cases, you should be able to fix it remotely. That requires full remote device management capabilities that extend way beyond traditional monitoring and remote access. Necessary on-site interventions should be restricted to IT/AV service cases, so you can partner with established IT/AV service firms that can provide quick service at all locations. In most cases, operating a business critical digital signage network will require some form of network operations center (NOC). For most digital signage integrators, this is a step change in comparison to the service operations they are running today.

As you see, business critical digital signage has high and complex requirements. It is no surprise that every vertical has its own specifics and demands. On the next pages, we dive deeper into the most important verticals – from retail to cinema, from QSR to C&C. For all of them, digital signage has become a vital part of their business.

Also on the shopfloor, digital signage can be business critical.

Photo: Mercedes Benz Group

QSR

No Screens, no Service

Digital menu boards, order kiosks, order management – and the modern drive thru. McDonald's, Burger King & Co. are at the forefront when it comes to business critical digital signage.

Florian Rotberg

Quick Service Restaurants have come a long way from shabby fast-food venues to highly efficient, experience driven spaces. Digital signage has played an integral role in making QSR attractive for guests and operators alike. Displays have become so important for QSR, that a digital signage outage would cause all restaurants to close. A prime example of business critical digital signage.

Menu boards that change according to the time of day have been part of McDonalds for 20 years. Previously, the restaurant manager used to flip the backlit menu board form breakfast to main offering shortly before lunchtime. Fast forward to today and digital menu boards are the standard in the QSR market. Even Ikea and canteens are not able to operate without digital screens and order terminals anymore.

Photo: invidis

Quick service restaurants like McDonald's can no longer operate without digital signage.

Photo: invidis

Digital displays in QSRs have prevailed internationally.

The entrance area of any given QSR restaurant will most likely be dominated by self-service kiosk terminals. The low-cost kiosks – often small-screen HTML-based touchpoints – enable guests to order their menu without lining up. Kiosk-usage is very popular, especially at locations with many tourists (e.g., airports), as orders can be placed in many languages. The perceived waiting time is also shorter because the order will start to be prepared in the kitchen before the payment process is finished. Order terminals are popular with restaurant operators because the systems are much better in upselling, leading to higher average orders. In addition, new products and services like "build-your-own-burger" or table service – previously unheard of in the QSR industry – can now be offered with self-service order terminals.

Digital Sales Experts

While the success story of order kiosk terminals is a recent one, digital menu boards were the first touchpoint in QSR restaurants that was digitized. The main benefit of digital menu boards (DMB) is a more detailed parting of daytime-specific offers. Another major advantage is the ability to quickly adapt to supply chain issues, only promoting products which are currently available in the restaurants. Promotional products, especially, can run out faster than planned without anticipation.

DMBs offer even further hidden benefits, like a more simplified, visually appealing menu layout. Less items on the screen amplifies restaurant throughput, especially during busy times like lunch time. Even though all menu items are still available for order, most guests order what they see on the displays. Besides increasing efficiency with a focused and more relevant offering, DMBs also enable total domination experiences: For a short moment all DMBs screens are combined for a special promotion. A campaign no guest can escape.

Whether digital menu boards or order kiosk terminals, digital signage has become the standard in QSR. It offers a consistent customer experience and information both mobile and on-site. Pre-order via app is adopted at a rapid rate, which requires a seamless user-experience across all platforms and touchpoints.

Sophisticated Hardware

The drive thru has become the latest area of digitalization in the QR business. In North America, 70 to 80 percent of QSR guests prefer the drive thru. In Europe and APAC on the other hand, the vast majority prefers to dine in. But the pandemic accelerated the trend towards drive-thru on a global scale. Restaurant operators around the world are retrofitting or upgrading drive thru facilities. And digital is a must-have, although high-brightness outdoor screens are undoubtedly not the easiest form of digital signage. Operating temperatures vary between hot summers and very cold winters, and screens need to be extra bright for the content to be visible even in direct sunlight.

But the digital signage industry developed a wide variety of drive thru hardware solutions that can weather the elements of nature. Concept and content of drive-thru touchpoints are mainly determined by what guests encounter inside the restaurants. With one big exception: At the drive thru, digital signage can be fully personalized because only one guest at a time looks at and interacts with the screen. That is the reason why AI-based suggestive selling is being implemented at an increasing rate. According to Stratacache, "suggestive selling allows a platform to weigh out hundreds of situational awareness variables – including consumer, product, weather, traffic, spend pattern, product velocity, transaction time, and crew availability".

AI Helps with Service

Like in all industries, AI is currently also on the way to revolutionize how QSR businesses personalize guest experiences and optimize internal processes. Because consumers are already spoiled with personalized experiences on their mobile phones, they expect similar offers also on digital touchpoints in public spaces. But personalization has its cultural and regulatory (GDPR) limits which can differ widely from region to region. Regardless of the current levels of personalization, AI will boost digital signage and enable restaurant operators to offer more relevant content and more personalized experiences.

While guest-facing digital touchpoints are omnipresent – including displays for the queuing system –digital signage screens for internal use are just as important for restaurant operations. QSR chains mainly use employee-facing and kitchen displays for order production and order management. At drive thru windows, displays support employees to serve the right customer by showing a photo of the correct vehicle.

Technology Boosts Sales

"Because consumer actions are highly predictable, mobile devices and sensors in the drive thru can inform with accuracy what frequent customers will order, while tailoring a menu to customer taste.

On top of that, these technologies factor in the number of consumers visiting the location over the past hour, week, or month; the local weather; or traffic – and all of these variables play into the probability of a particular order being placed. Smart sensors deployed in kitchens can track which items are being held versus which ones need to be queued for production.

This is adjusted based on the size of the line – for example, if a long line of cars snakes around the building, the digital menu board will downplay items that take longer to prepare. The total package of predictive technology can help cut 11 to 30 seconds off each customer's drive thru experience, and improve overall sales by 5 to 7 percent."

Chris Riegel, CEO of Stratacache

Photo: umdasch

ESLs are a vital part of retail operations.

RETAIL

From ESLs to Staff Devices

Business critical applications in retail environments go beyond the use of digital signage screens in the shop window. Moreover, they serve a functional part in logistics and operation.

Stefan Schieker

When people think about digital signage in retail, the first things that come to their mind are typically shop window displays, screens behind the cashier zones, or ambient and promotion displays. Finally, they account for a large portion of the total digital signage market. While all these more or less marketing driven screens certainly have an impact on the sales of a retail store, we would generally not consider them as business critical.

However, there are several business critical use cases in retail as well. First of all, electronic shelf labels (ESLs) provide a business critical function. Correct display of prices in many countries is even a legal requirement. Luckily, the widely used e-ink displays are very robust and continue to display information even without power. Therefore, it is relatively easy to create fall back scenarios when power or network connectivity fails.

Secondly, there are checkout systems. Definitely business critical for retailers, but typically not considered part of the digital signage industry. However, with the increasing deployment of self-checkout terminals and kiosks, we see more and more digital signage players also entering this space.

Thirdly, especially vertically integrated retailers like H&M or Inditex, or brands coming from an ecommerce background, use a lot of digital processes in their store operations. These processes range from clienteling, over staff management and training, to logistic functions like ship-from-store. While most of these functions involve handheld devices more than large format displays, many of them can be and are implemented on digital signage platforms. In modern retail, a store fulfills many different functions at once and at least part of them involve business critical digital systems.

Last but not least, in some store concepts digital is such an important part of the overall customer experience that a failure of the digital signage systems would destroy the whole experience. Just think for example of flagship stores where digital screens, interactive touchpoints, scent, and sound are an integral part of the overall store concept.

Overall, retail might not be the first place to look for business critical digital signage solutions as a major part of the industry is still working on earlier stages of digitization. But with the increase of highly connected and integrated digital concepts and the implementation of DSXPs or DXPs, there will be more and more business critical applications, both customer-facing and on the operational backend.

COLLABORATION

Europe's Finest

Large enterprises and government bodies like the European Union rely on sophisticated administration processes. During the pandemic, scenarios like hybrid collaboration settings with simultaneous translation became business critical.

Florian Rotberg

Meeting room displays, collaboration boards, encrypted communication, and – most importanty – simultaneous translation services: Digital signage and ProAV have become business critical for large corporations and government bodies, like the European Union. Especially since the outbreak of the pandemic.

While the world went into lockdown, government institutions instantly became busy managing the crisis 24/7 from the office and from home. The European Union was not the only one to bring ProAV and Digital Signage to the center stage. The EU – which governs policies for 27 member states and a population of about 450 million Europeans – operates more than 1,000 meeting rooms in Brussels alone. These require a flawless and easy-to-use collaboration infrastructure.

Hybrid Challenge

Even more essential, especially for a supranational organization, are translation services. More than 3,000 simultaneous interpreters translate into all official EU languages 24/7. Before the pandemic, most of the important meetings were held in-person in Brussels. Now with most borders closed, everything shifted to an online-only or hybrid environment.

To have perfect sound and video quality without latency is essential in video conferencing – especially when dozens of simultaneous translators are involved in every meeting. These are challenging requirements for cloud-based, government level encrypted business critical infrastructure supporting thousands of meetings daily.

But the EU requires much more than just collaboration. Hundreds of buildings and conference centers need to be equipped with digital signage-based way-guiding. Activity-based work requires a flexible ProAV and digital signage IP-based infrastructure, which is not limited to on-premise anymore. Historically, the EU operated dozens of different solutions – regarding hardware, software, and operations – which are now being standardized. While this poses no problems for platforms, bandwidth management remains a daily challenge, as usage differs dramatically in the context of political crisis.

Planning and Managing one of Europe's Largest AV Contracts

Every four years, the EU tenders a new framework agreement covering everything of ProAV and digital signage within the Union. The agreement is split in four lots – consulting, supply of hardware and software, systems integration and commissioning, event support – amounting to 220 to 240 million Euros.

In the past, both consulting and concept design were provided by integrators, lacking an independent oversight. The current agreement for the first time includes an independent consulting lot for concept design, project management, and quality management, avoiding any conflicts of interest.

Highly Contended but Hard to Achieve

"Integrators are not equipped for such specialized work including necessary governance, reporting, and multi project management," says Oliver Mack, Managing Partner of Macom. The Germany-based ProAV consultancy won the EU consulting tender worth approximately 17 million Euro, probably one of the largest ProAV consulting contracts ever awarded in Europe.

"The project setup is extremely demanding, covering EU offices in all member states but also EU agencies and EU embassies. In total, covering projects across 60 clients with very different maturity levels and languages requires enormous scalability". A strategic project too big for a single consultancy. Macom teamed up with real estate consulter Drees & Sommer, a 4,000 plus employee consultancy, managing 60 billion Euro project volume annually. The consortium is supported locally by subcontractors in France, Belgium, and Luxemburg – the main countries with EU institutions. "In total, more than 100 AV-experts with varying skills work on the project teams. Together with Drees & Sommer, the consortium is present in all EU member states."

Although highly contended, not many bidders were able to comply with the required skills in the tender. More than 50 ProAV skill profiles and certifications were listed – too specialized for global professional service organizations, like Deloitte or building consulters. Undoubtedly, US-based ProAV groups like AVI-SPL, Diversified, or large AV-Consultants like Waveguide would have been qualified for the tender, but struggled to provide people and facilities on the ground in 27 EU-member states and supporting more than 20 languages. Even pan-European contracts require local knowledge and presences.

Especially during the pandemic, ProAv and digital signage applications were essential for institutions like the EU.

Photo: Guillaume Périgois/Unsplash

SHOPFLOOR SIGNAGE

Central Point of Information

Large format screens and LED are increasingly being deployed on the shopfloor to provide production, process, and corporate information to employees without computer access.

Florian Rotberg

Shopfloor signage enables coordination between production lines and provides production workers with a simple and real-time access to critical information such as production orders, production KPIs, quality indicators, security instructions, and maintenance processes.

Digital signage is not only limited to the shopfloor but also provides crucial real-time information in warehouses and at other logistics touchpoints. Logistics providers communicate in and around their warehouses via digital signage with drivers or site workers and use it to facilitate easier onsite operations such as the preparation and palletization of the orders or the loading/unloading of the trucks.

While installing some screens in a factory may be an easy task, connecting the digital signage networks to business process solutions and IT-backend-systems is much more challenging. Shopfloor solutions are much more than just a screenshot of a BI-Dashboard. Visualizations need to adapt to production situations and condense relevant information from different backend systems on one screen. A process-relevant, business critical solution requiring digital signage specialists like Telelogos that have created shopfloor signage for SAP customers in various industries.

Integration

Shopfloor and logistics digital signage solutions must integrate with multiple internal, as well as external, data sources. Among the internal platforms to be integrated are MES (Manufacturing Execution System), which are usually legacy business applications that monitor, track, document and control the process of manufacturing goods from raw materials to finished products. In addition, business data supplied by ERP and CRM need to be integrated and security instructions need to be stored on the corporate Health and Safety cloud. Last but not least, it needs to contain corporate and site-specific employee information from the intranet.

IT-Security

Integrating digital signage with IT-backend solutions always brings very delicate IT-Security challenges. Digital signage on the shopfloor requires very secure hardware architecture and infrastructure. Displays are deployed in multiple locations and some of them might be easily accessible from unauthorized persons. The digital signage setup must therefore offer advanced security capabilities to limit the risks of intrusion. Access control must be tightly managed and security policies aligned.

Interactions

The first generation of shopfloor signage were mainly ceiling-suspended screens processing KPIs. Today's shopfloor signage concepts are often interactive via touch screens, RFID, image and movement analysis, QR code or barcode reader that are attached IoT devices. The systems interact with the user, sending back business-relevant information to the connected systems. Often, touch screens are not suitable, as workers use gloves or screens and stand too far away from the operator. Other forms of interaction, for example gesture control, physical buttons, or voice are used for interaction.

In general, shopfloor and logistics signage are one of the fastest growing digital signage market segments. In contrast to popular belief, digital signage CMS play a major role as they consolidate dashboards and real-time information from various third-party systems. Accurate digital information is business critical in factories, loading docks but also outdoors across the factory site.

Mercedes and DS

A famous example for shopfloor signage can be seen at Mercedes-Benz: Real-time work instructions and individual information are provided to workers through the production system MO360, optimizing production control based on key performance indicators. Digital signage displays support the workflow. The full digital ecosystem was used for the first time in the Factory 56 in Sindelfingen, which opened in fall of 2020.

Photo: Mercedes Benz Group

Production at Mercedes-Benz with the help of digital signage

C & C

Everything Under Control

The epitome of business-critical digital signage are command and control room concepts. Either for public services like security, defense and traffic control or semi-public like utilities but also in the private sector for large production sites.

Florian Rotberg

All command and control centers have in common that they provide a secure room in a facility for centralized monitoring, control, and command of a situation. In recent years and especially since the end of the post-communist world order we have come accustomed to in the past 30 years, the demand for C&C is exploding. Government, defense installations, borders but especially national infrastructure (electric grid, gas distribution and broadband) needs to be remotely monitored and protected from physical and cyber attacks.

While in the past, control rooms were dominated by video wall cubes displaying live surveillance camera images, today's control and command rooms need to be flexible to enable aggregations of intelligence by monitoring CCTV-feeds next to complex data visualization and execute response plans in real-time.

"A typical C&C scenario – a non-authorized person is jumping over a fence, the intruders' position is identified by CCTV and sensors, and a response plan can be immediately triggered," explains Stephen Wair, Business Segment Lead Control rooms of Sharp/NEC in an invidis interview. "While in the past monitoring was the main work benefit, today it is the combination of monitoring and crisis management."

Combined C&C

Until recently, government agencies and the private sector operated separate control and command rooms for physical security, network security, and business operations. Today's multiple risks require a combined C&C under the same command. Instead of one large video wall, latest C&C layouts include multiple video walls in one room. And in emergencies, the depth of information and layout of the fine pixel LED-walls need to change at the press of a button.

While single-use control rooms are still common in the Middle East, North America, or in APAC, Europe is rolling out fully integrated C&C rooms which are usually located in existing buildings and not in purpose-built structures. A combined use requires higher resolution videowalls rather than single-applications, for example CCTV-monitoring.

DV LED Is Gaining Importance

"Currently only about 10 percent of larger C&C installed projects utilize DV LED, 90 percent are still rear projection, a dated technology with high costs and limited durability. The most economic visual solution technology is still Full HD videowall-LCD, as they offer great resolution with small bezels (0.88mm)."

The criteria for choosing the best-suited technology are what sources at any time need to be displayed and in what resolution. "If the resolution of C&Cs is not sufficient, a control room operator can run out of available pixels even with a few hundred square meter of videowall."

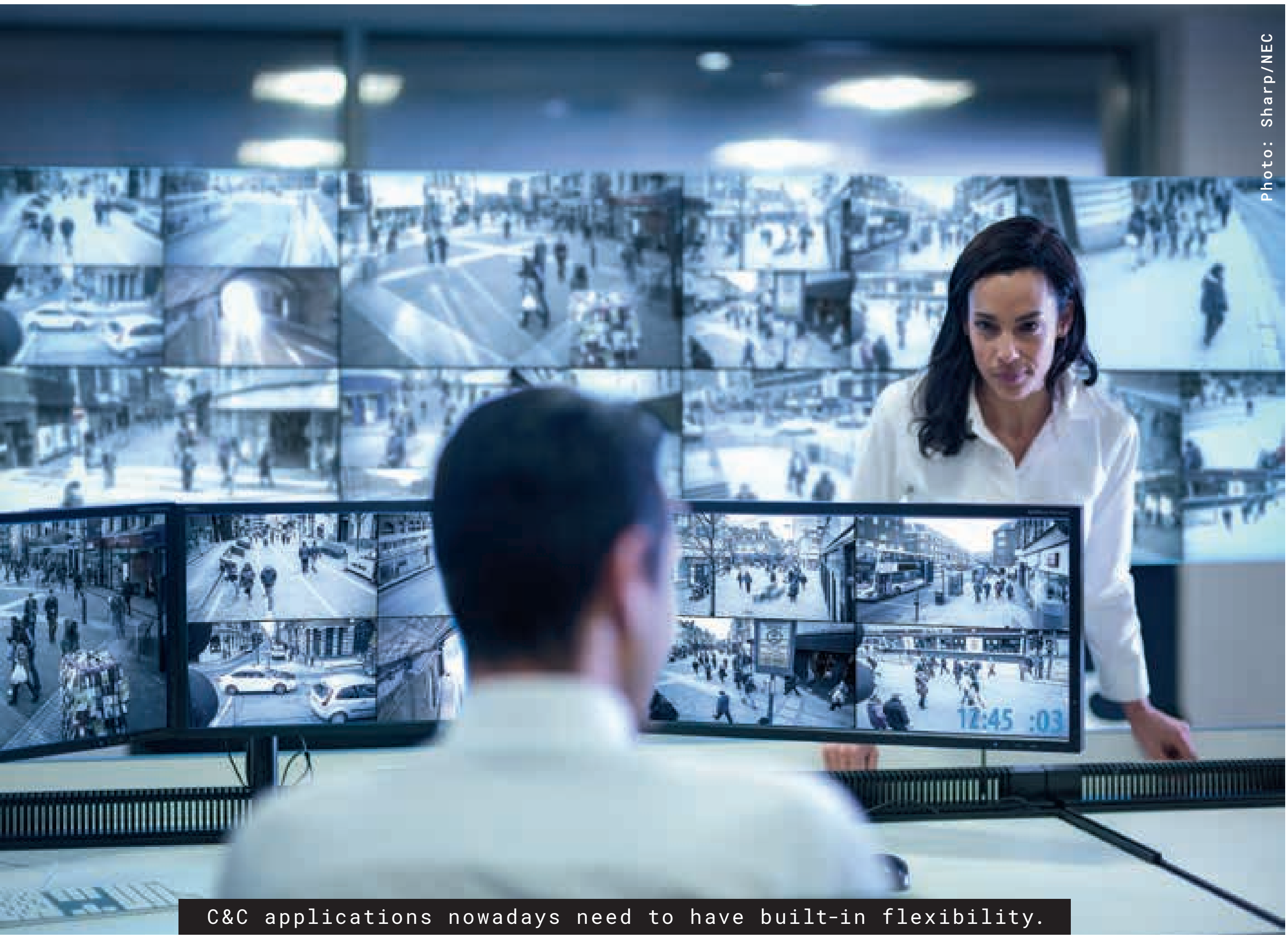


Photo: Sharp/NEC

C&C applications nowadays need to have built-in flexibility.

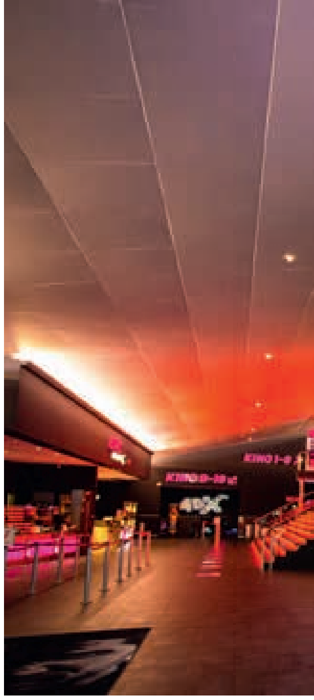
In northern Europe – Germany, Switzerland, Austria, the Netherlands, and the Nordics – C&C are usually smaller but multiple, fully connected walls with higher resolution. Combined teams use the setup very flexibly – from monitoring 5 meters away from the wall to collaboration situations only a meter in front of the screen. In Southern Europe and the Middle East, C&C video walls are usually only a source of information, and the pixel pitch is less relevant.

Reliability Is Not Something To Rely On

As C&C are business critical, single points of failure are not acceptable. Therefore, Sharp/NEC and other visual solution providers use multiple power supplies, and everything needs to be failover-proof. Cabling is as important as screens – control and command projects solely use IP cabling with additional extra cables as spare, as some extra cables are very cheap compared to the full setup.

Special AV-over-IP software solutions like Hiperwall and Userful, enable operators to display any source on any screen, making it easy to adapt visualization to changing situations or in case of failure of one screen. The videowall software layer sits on top of the corporate network capturing all data and video sources, making them available on one platform. Today's C&C solutions require sufficient headroom on the IP backbone for video-over-IP in high resolutions.

This built-in flexibility also comes in handy in circumstances where companies merge, or roles of department change way quicker than in the past. C&C projects are planned and installed by a few highly specialized AV integrators, which have embraced the IT world quickly.



CINEMA

The Real Blockbuster

To manage complex content and to provide much-needed revenue streams, cinema operators rely on digital signage as a business critical element.

Florian Rotberg

The largest cinema screen in the world is 38m wide and 22m high at the Imax Böblingen in Germany. However, the real business driving force is much smaller and comes in a ratio of 16:9. As film studios keep up to 62 percent of the ticket revenues, cinema operators are highly reliant on concession revenues in the lobby. Creative business models are necessary to operate cinemas profitably in a post-pandemic, streaming service-oriented world.

Cinema lobbies are a unique opportunity for the digital signage industry – probably one of the verticals with the highest display density. Larger multiplex cinemas feature more than 150 screens inside their lobbies, mainly for film promotion. However, the screens are also vital for F&B offerings and "classical" ads, marketed directly by the cinema and/or a sales agency.

Cinemas are in a similar position as gas stations – everyone is offering the same product. Because all film theaters show the same movies, consumers simply choose the one most conveniently located. Even more are choosing to stay at home and watch the same film on a streaming platform a few weeks later. Cinema visitor numbers are declining across the globe, a trend difficult to reverse.

As a survival strategy, cinema operators now bet on transforming their entertainment center into a meeting place that offers unique guest experiences. Food and beverages play an integral role here. Other strategies include concepts like boutique cinemas, special seating elements like Loveboxes or recliners, special screen and experience format cinemas – like 3D, 4D or Screen-X and Premium Large Format (PLS) like Imax – or special concepts like Cinema On Demand /Privat Cinemas with a large library of interesting titles in original or multiple other languages. All these formats aim at offering a unique experience exclusive to the cinema. The film and cinema industry has suffered tremendously during the pandemic. Established business models, like the rigid show timetable, do not work anymore.

The core of business-critical digital signage in cinemas are the dozens, if not hundreds of portrait mode screens advertising upcoming film releases and landscape screens showing trailers. Promotion for major film releases starts long in advance, sometimes more than a year before the launch. With dedicated marketing budgets and digital signage content, studios and distributors support the promotion. At any given time, 50 to 80 films are being pushed simultaneously in larger cinemas.

Highly Complex Content

Managing the content is a huge challenge for larger cinemas, as cinema operators are flooded by the studios with continuously updated content the closer the launch comes. Big blockbusters can

Digital signage has become indispensable for cinemas.

Photos: imaculix AG

Managing trailers places high demands on DS systems.

have up to four different artwork campaigns and up to ten different trailers for a single language version. In some countries with multilanguage movie offerings like Switzerland, studios provide a few dozens of different content versions. For Lord of the Rings, for example, 119 different film versions were shown in Switzerland alone. It was also the movie with the largest inventory of digital poster content ever. The posters consisted of different digital signage campaigns for four different language versions – German, French, Italian, and as original version (OV) – different audio-formats (Dolby Atmos, DTS-X), different resolutions (4K, Imax) and experience formats (3D, 4DX, D-Box, Screen-X).

Managing and scheduling digital signage playout is a complex task. The core systems cinema operators use are the Cinema Box Office platforms. They offer central management of ticket sales and film programming for current and future releases. Scheduling of digital signage content is also usually managed through the central box office system. The CMS combines programming and pricing information with content (regular artwork, character artworks, animated living one-sheets, multiple living one sheets) provided by the studios. Trailers are presented on separate landscape digital signage screens in the lobby. Again, scheduling is a challenge because some trailers are age-restricted and can only be played out later in the evening. To manage such complex tasks requires a highly automated ecosystem – from content to playout. Another layer of complexity is added by the multiformats that cinema chains have in their multiple locations. Imax movie versions, for example, should only be promoted in locations that offer Imax.

“Signage isn’t limited to the lobby. The customer journey already starts before the cinema – online, on social media, on outdoor screens, and on lobby screens: all content needs to be orchestrated,” explains Andy Bohli from Swiss digital signage and cinema specialist Imaculix. “Studios are really picky with the artwork and correct scheduling. Texts and starting dates need to be studio-specific and localized.”

No Breakthrough yet for Cinema LED

While digital signage has become business critical in the lobby and at concession stands, the cinema screen is still dominated by projection. A cinema projector can cost as much as a mid-sized car and needs to function reliably. Business cases are changing from invest to “Power by the Hour” and projectors can be refurbished for an extended lifecycle.

The cinema LED-boom got to a standstill during the pandemic and has not yet rebound. In 2018, Samsung launched Onyx with great fanfare. Four years later, LG and two Chinese LED manufacturers followed with dedicated Cinema LED in 2.5- and 3.4-millimeter pixel pitch. The great media attention the first LED cinemas received has subsided. Cinema operators and integrators are taking stock. Although the technology is there – selected LED solutions are DCI-certified – the business case does not yet work for multiple reasons. LED is still much more expensive than projection. LED walls are much heavier. Lastly, the studios somehow are not too keen on having their films appear on LED. Cinema LED, however, remains a technology with great potential. The global breakthrough is still possible.

AIRPORTS

Impressive and Important

Airports, their major airlines and retail tenants started very early with digital signage. Nowadays, displays are not only great eye-catchers but business critical helpers in the workflow.

Dave Haynes

Airports and their larger air carrier and retail tenants were early adopters of digital signage, and as that technology has evolved, those busy, sprawling venues continue to push the possibilities for networked and interactive displays.

Anyone looking for guidance on the state of the digital signage art, and emerging applications, will get a lot of cues and ideas by passing through a major airport – particularly those undergoing substantial renovations and expansions.

Flight information and departure gate displays in airports were among the first widespread use-cases for data-driven displays, tracing all the way back to the days of CRT monitors. Now data-driven flat panel displays are doing everything from relaying real-time arrivals and departures information to providing key status and assignment information to the ground crews that service commercial flights.

Retailers – particularly duty-free operators with large footprints at major airports – have broadened already heavy use of flat panel displays to market luxury goods to also make large format digital displays key elements in store design.

The busy pre- and post-security common spaces and concourses of airport terminals have long been papered and then digitally peppered with advertising poster faces by media companies that win the rights to be there. But the emergence of finer-pitch LED displays has made it feasible for those media companies to install large-scale displays that visually dominate these spaces.

Large airports were also among the very first venues to embrace the concept of experiential spaces and media, and back that up with capital and operating budgets. Back in 2013, jaws dropped in the digital signage community when the renovated international terminal at LAX opened with monumental, iconic digital installations as key features. Almost a decade on, new terminals and upgrades regularly include high-profile digital components.

Here are some real world examples of how digital signage is being applied in steadily interesting ways at airports:

Delta at LAX

In April 2022, U.S. carrier Delta Airlines completed and opened heavily renovated and upgraded passenger and operating spaces at LAX. The highest profile element was a 250-foot (80 meter) horizontal Nanolumens LED video ribbon spanning the wall behind the check-in counters.

The display brands the airline, using custom creative that was produced in-house, uses data layers to show real-time flight departure data, and provides guidance for check-in and baggage processes that are increasingly self service-based.

Displays at La Guardia airport

Photo: Delta Airlines

Behind the scenes, Delta has developed and deployed what it calls Ramp Information Display Screens (or RIDS) that tie into operational systems, displaying real-time data that informs ground crews of things like timing, status and assignments.

Ryan Taylor, who manages some 1,800 screens across Delta's airports network, likens these displays to digital dashboards. "The ramp people who load the bags and service the plane and everything, we have our RIDS displays out there for them, giving them a whole lot of data on specific flights, even without access to computers."

"Having a display on the ramp that shows where that flight's going, how many bags are left to be loaded on, how many passengers... all of that data, which helps operations run, is really front and center for them, and has a really positive impact on how the airline operates."

With the LAX upgrades completed, similar work is now underway at New York's La Guardia Airport, including a new variation on data-driven displays aimed at guiding and informing travelers at security screen checkpoints.

Making boarding better

The Brazilian carrier Azul Airlines is using dynamic overhead projections and sensors, from the Brazilian IT services firm Pacer, to improve and speed up boarding at gates.

The idea is to board flights based on seat assignments that are projected on the floor and shift ahead as boarding progresses. So if you are in 17C, when that row is called you enter and follow the shifting, projected box as it progresses to the door and jetway.

Azul calls the system the Azul Blue Carpet, and Pacer's marketing material suggests boarding speeds can be improved by as much as 60%.

Steady innovation

Digital signage technology is now central to how airports operate both in public areas and back of house. The dynamic, highly variable nature of airports – where rough weather or breakdowns can trigger chaos – makes them ideally suited for messaging that can be automated and omnipresent.

They're also spaces that are steadily upgraded, have massive capital budgets and increasingly operate with mandates that emphasize the need to improve the overall experience of commercial flying.

If you want to see where things are at in digital signage, and where they're going, head to a major airport.

DIGITAL SIGNAG MARKET

Read the story behind this picture on page 100.

Photo: Adrenorama

The Ukraine war is also affecting the digital signage and DooH industry.

Photo: invidis

DIGITAL SIGNAGE TRENDS

Disruptions on a Global Scale

From the war in Ukraine over green signage to global supply chain issues: The trends that move the digital signage industry today will have a lasting impact on the future.

Florian Rotberg

The last twelve months not only caused dynamic developments in the digital signage industry but saw global disruptions on a historic scale. Looking at the trends that shaped our industry, we can identify digital signage-specific developments as well as global events that will have a deep impact on our industry. invidis discusses some of these topics in this article.

Simplified Signage

One of the most important trends dominating the show floor at ISE 2022 Barcelona were solutions to simplify signage. While installing a screen is a simple task, installing LED walls worth a few hundred thousand Euros or connecting business-critical CMS solutions to existing ERP or CRM systems are different challenge. The hardware industry is focusing on making digital signage installations, operations, and maintenance easier.

While a standard LED wall consists of a few dozens of cabinets and hundreds of components and cables, the latest LED All-in-One solutions arrive pre-installed in one package (and one SKU). Instead of three days, installation only takes three hours. Setup and calibration are controlled by remote control and smartphone app. With no specialized equipment necessary, costs can be radically reduced.

The well-established display solutions have also been improved. Not only installation has become easier but especially monitoring and repair work. The industry developed remote device management tools and hardware features which enable solution providers to remotely reboot and fix devices without sending a crew onsite. Interestingly, remote device management is not limited to a specific brand anymore. More and more vendor agnostic solutions are becoming available.

The all-in-one concept is seen in complete kiosk solutions like those from LG.

Photo: invidis

Remote Device Management

Business-critical digital signage like the drive thru displays in QSR or shopfloor signage in manufacturing need to provide excellent uptime. Choosing the right components and hardware devices for each specific operating environment is essential, as is continuous monitoring of the systems in Network Operation Centers (NOC). 24/7 monitoring was not usual for early generation digital signage, except when a fault was detected by chance.

Today's business critical signage networks need to be continuously monitored including remote device management for preventive maintenance. Standard IT-tools are typically not sufficient for complex digital signage networks. While most CMS offer extensive content creation, management, and playout features, the majority is lacking extensive device management features. One of the exceptions is Telelogos whose history roots back to device management services. Some OS platforms like Google Chrome OS or SoC-Systems from Samsung, LG, and PPDS provide a rich remote device management feature set. But often these solutions are not agnostic and therefore work only in homogeneous networks. Unfortunately, the reality of digital signage is usually a vendor mix.

Integrators like Stratacache also offer 24/7 multibrand NOC service for large IT Integrators. But digital signage brings its specific requirements which call for a dedicated industry solution. The perfect tool is still missing but SignageOS, Samsung, Google, and Intel are already offering proven solutions. Customers of business-critical digital signage require reliable and robust solutions, which the industry needs to be able to deliver.

Ready for Next Gen Software

The vast majority of digital signage CMS platforms are becoming outdated. Today, most ISVs are still able to provide solutions to all customer requirements, based on a wide feature set and deep knowledge of the tech stack. This will most likely not be sufficient anymore towards the end of this decade. Software architecture – historically on-premise – is moving to the cloud. While most ISVs managed the transition from on-premise to the storage cloud (Amazon AWS, Microsoft Azure), very few have made the switch to the service cloud. Service cloud-based platforms usually require a full new development in form of a green field approach. Most ISVs have shied away from the investment of 2-3m Euros so far. Just updating the GUI may look nice but is not sufficient to remain competitive in the long run.

One of the few established digital signage integrators who already managed the shift, is Stockholm-based Visualart. Main driver were new global projects requiring an extensive backend data exchange across continents, an API-first approach to handle multiple and constantly changing third party data exchanges, certified IT-Security requirements, and finally access to developers. The war for talents has led to a tight labor market. Developers prefer to work on modern software instead of legacy architectures.

Developing a new service cloud-based CMS platform also enables ISVs to benefit from new features continuously released by Amazon, Microsoft, and Google. Even smaller ISVs have the advantage of acquiring ISO-certification and latest features like SSO. The CMS platform market is going to consolidate like the integration market. Millions of installed base of successful ISVs will be necessary to properly scale development, not only a few ten-thousands like today.

Green Signage

The demand for more sustainable signage solutions has increased noticeably during the pandemic. Since the invasion of Ukraine and the emerging energy crisis, energy efficiency has become an even more pressing issue in Europe. Before the war, electricity costs were already four-times as high in Germany than in Korea. The current geopolitical events will widen the gap. The focus is on more efficient hardware and, especially, on more efficient operations, as 80 percent of the digital signage carbon footprint is produced during the 5-8 years of lifespan *(for more information please see our Green Signage-special yearbook 2021).*

But besides energy efficiency, the transition towards net zero and improvements in circular economy are becoming more important. Most relevant for digital signage are new initiatives for repair, refurbishment, and eventually, recycling of digital signage devices. Industry leaders like Sharp/NEC have already started to repair displays and LED modules in Europe instead of replacing them.

invidis also launched other initiatives to explore refurbishment and remarketing of used displays in an efficient and vendor-agnostic way. Independent access to some key device metrics (like total running hours and operating conditions, average and max level of brightness) is crucial and would enable third parties like IT leasing companies to evaluate the residual value for remarketing. In addition, digital signage users should explore how they can move older screens to other locations, where the reduced brightness and picture quality are still sufficient. The lifetime of screens could be doubled if location and touchpoint concept were adapted according to the quality of the device.

Last but not least, recycling of precious metals and materials should be made easier for future product generations. Some metals in high-brightness screens are a complex blend of high-performance materials, similar to what is used in the aerospace industry. But for the vast majority of components, separate recycling would be possible.

Supply chain gap: The global supply crisis will continue.

Photo: invidis

Future green signage initiatives will require new, bold, and probably unorthodox approaches to be successful. Because B2B customers expect the industry to provide the most sustainable solutions possible, there is no other alternative.

War for Talents

The invasion of Ukraine disrupted operations of many European software companies. Many market players relied on developer teams in Ukraine, Belarus, and Russia for high-quality and comparably inexpensive software development. Some digital signage companies had their own teams operating in Kyiv, Kharkiv, Minsk, or St. Petersburg. Others relied on service providers in the region for their software development. The war in Ukraine has brought much of the software development business to a standstill. While some development teams in Ukraine have continued work, many developers fled the country or were drafted by the armed forces.

Many Russia-based developers and creatives also left when their home country invaded Ukraine. Russia's digital nomads – mostly critics of current Russian politics – fled to Europe, Israel, UAE, and Latin America. Many of the digital nomads' businesses had just started to go global but could not continue to be operated out of Russia. Because of new restrictions brought on by sanctions against Russia's business sector in response to the war, operating international businesses is almost impossible.

War-affected software experts as well as project managers and sales staff are missing across Europe's digital signage industry. Almost all market players are searching for qualified and experienced talent.

Managing the Shortage

The pandemic has brought new challenges to the globalized world. Lockdowns, limited shipping resources as well as changing buying patterns made digital signage procurement extremely difficult. Especially visual solutions like displays, LED, and projectors were difficult to obtain in 2021. In 2022, this has changed. Almost all display vendors in Europe had planned ahead and are now well stocked for the new year. Integrators also stocked up on popular visual solution devices to deploy important projects. But sourcing CPUs and, subsequently, media players remains a huge challenge. IT supply chain experts are still skeptical towards CPU supply for 2023.

Beyond managing day-to-day supplies, global trade – and with it the digital signage industry – is transitioning to new manufacturing and logistics processes. In summer 2022, many products are missing temporarily – not always due to congested ports, but to globally disrupted production and supply chains. A shortage of semiconductor chips, electronic components, and building materials are delaying digital signage projects.

Containers are stockpiling in many ports around the globe. Customers are slow in collecting their containers and leave them in the ports for five days or longer, instead of one or two days. There are several aspects reinforcing the current challenges: It started with the pandemic, followed by the blockade of the Suez Canal in addition to weather incidents, and the Ukraine war since spring 2022. Due to the conflict, Europe is experiencing a shortage of around 100,000 truck drivers from Ukraine and Belarus.

Adding to this is China's rigid zero-covid policy, which imposes strict lockdowns when only low infection rates occur, and repeatedly brings international transshipment points to a standstill.

In 2022 many digital signage projects are delayed, not necessarily due to a lack of digital signage specific components, but due to a lack of building materials for the newly built store, or simply due to delays in transportation.

Recession

The foreseeable end of the pandemic boosted the demand for digital signage almost to pre-pandemic levels (2019). But the boom seems to be short-lived, as the global economy is on its way to a recession due to the war in Ukraine and exploding energy costs. Business sentiment in the European digital signage industry is at an all-time high. Record orderbooks lifted demand by 40-50 percent in 2021 and in the first half of 2022. Still, the economic outlook is bleak.

M & A

Non-Stop Consolidation

Mergers and acquisitions continue in the digital signage market. Five goals of market participants are driving the transformation. More and more players seek intercontinental transactions.

Florian Rotberg

Consolidation didn't even stop at the heights of the pandemic. On both sides of the Atlantic, market observers agree that the global digital signage industry is still way too fragmented, and that more consolidation is necessary. According to Avixa, the global digital signage market will reach USD 35 billion in 2022, and USD 44.7 billion in 2026. Even if the forecast might need to be adjusted downwards due to the war in Ukraine, an emerging energy crisis, and a looming global recession, the market for digital signage is and will remain a growing one.

Market players have not yet caught up with the boom. While a handful of digital signage solution providers generate revenues of USD 500 million, the vast majority in Europe, North America, and Asia generate annual revenues that amount to a double or low three-digit million USD sum. In the software sector, most ISVs not even reach the USD 10 million annual revenue threshold.

But the industry is transforming rapidly, especially through the pressure exercised by much larger IT integrators who are increasingly entering the digital signage market. Consolidation not only applies to joining forces with direct competitors but stretches across the value chain. Software vendors, for example, expand their offering with integration services, like Scala and Grassfish, and formerly software-independent integrators develop or acquire their own CMS platform.

Five Goals

As most players in the market are held privately, most transactions are supported by financial investors. In general, we see five drivers of consolidation:

- **Market leadership**: The aim is to become at least two-times the size of the closest competitor. Few, but large and internationally positioned digital signage solution providers are fighting for this position, as for example Hanover Investors, who acquired Zeta Display and follows a buy-and-build strategy.

- **Vertical specialists**: They are trying to become the one-stop-shop for a specific vertical. An example poses Uniguest – the hospitality tech group – which acquired digital signage and tech experts, focusing on building an end-to-end vertical specialist for event spaces, hospitality, hotels, and senior living.

- **Competence expansion**: More expertise along the complete digital signage value chain drives this acquisition logic when, for example, an integrator acquires a software platform

- **Increasing installed base**: Software, in particular, is a game with strong economies of scale. Spectrio, for example, plans to build a global software platform leader acquiring dozens of smaller and larger digital signage specialists.

- **Adjacent Market Acquisitions**: Additional offerings for existing clients motivate this kind of deal. Examples are shopfitter Umdasch who acquired a digital signage integrator (Seen Media) and IT-leasing provider Econocom who acquired an adjacent integration business.

Big Players Are Necessary

Once a clear market leader emerges, the industry as a whole will benefit. Currently, mid-sized integrators battle for market leadership. The current competitive market situation drives valuations despite the overall economic situation. However, the competition also puts increased pressure on margins for large projects as market players are buying business. Valuation is usually based on EBITDA multiples, with higher multiples for companies with a high share of recurring revenues.

Markets like digital signage need large, international players to be perceived as relevant for capital inflow. In addition, fewer large players lead to more stable price levels and higher profitability. Only Diversified and AVI-SPL generate more than USD 1 billion annual revenue, consisting only of approximately USD 300 million digital signage specific revenue. In the software sector, only Stratacache, Samsung Magicinfo, and Navori have an installed base of more than a million active touchpoints. The majority of active licenses are part of legacy projects and do not yet generate full recurring revenues.

Today's M&A transactions for integrators mostly stay within continents and are less transatlantic, although most larger market players are actively looking for intercontinental deals. But digital sig-

For global operations, integrators need to reach a certain size.

Photo: invidis

nage requirements in EMEA and North America still differ widely. Cultural needs sometimes vary from country to country within Europe. Acquisition in Asia is not a big topic on the current European agenda, except for sourcing and project management.

Global transactions between digital signage software platforms are already more common, as software services are highly scalable solutions which can be sold easily. Regional adaption and onsite integration are much more difficult to deliver from one central place and remain a local business.

Germany, the Special Case

Germany – and to some extent UK – remains a special case in Europe: International players are keen on getting their foot into Europe's largest and most important markets. But corporate structures in both markets remain very fragmented. Many excellent, but relatively small solution providers are active in Germany and the UK, and dominant players have not yet been established like in smaller markets.

Consolidation is most advanced in the Nordics, where it all started. Today, three big players are fighting closely for market leadership with increased focus on expansion to other European markets. In contrast to the software business, digital signage integrators need a local presence with local staff in major markets to win tenders. Global contracts are usually won in the home market of the clients' HQ.

While the Nordics, Benelux, and recently also France are already highly consolidated, most other markets are still very fragmented.

Selected players driving consolidation are:

- Trison led pan-European consolidation with early acquisitions of TMM in France and Beaver in UK. Today, Trison is Europe's market leader with additional offices in Latin America and Asia. The company is up for sale, as existing investors are planning their exit. Although Trison scanned the German market intensely, they could not close a deal. Instead, Trison opened a project management office for local clients.

- Zeta Display became market leader in the Nordics by acquiring more than a handful of Scandinavian competitors, followed by two acquisitions in the Netherlands and one in Germany. In 2021, Zeta Display was delisted and acquired by Hanover Investors. According to the new owners, Zeta Display should become Europe's market leader via a buy-&-build strategy.

- Milan-based M-Cube became Europe's second largest integrator by acquiring French Calipa, pan-European Storever plus smaller acquisitions in Italy and the UK. The majority of M-Cube is owned by Paris-based investor HLD. The company also operates in the Greater China region.

- Vertiseit acquired seven small competitors and, just recently with Grassfish and MultiQ, two larger market players. Market cap of the only publicly traded integrator in Sweden reached close to EUR 100 million in early 2022 but has since then decreased to EUR 55 million.

- Tampa-based Spectrio is in the process of building a global digital signage software champion by acquiring software-only players as well as integrators. Spectrio offers its services predominantly directly (Website, Call Center) but also through partners.

- Diversified has grown to a USD 1-billion-plus-integrator for digital media, broadcast, and IT through multiple acquisitions. For most US integrators, building a national footprint from coast-to-coast and in all metropolitan centers is vital to serve large clients. This usually requires extensive M&A.

- Uniguest built itself into a global provider for customer-facing hospitality technology by acquiring Onelan, Tripleplay, Janus Displays, Otrum, and other tech-providers. The Uniguest strategy focuses on offering end-to-end solutions for hotels, restaurants, senior living, and similar vertical markets.

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The Consolidation Wave Arrives

In a marketplace crowded with service providers who all do roughly the same thing, consolidation and attrition are both inevitable.

Dave Haynes

The digital signage industry has existed now for some 30 years, going back to the days before that term was even used, and when broadcast studio software was being employed to push localized messaging to tube TVs.

Some companies have come and gone, or pivoted into different lines of business, but it's really only been in the last five or so years that a long-expected wave of consolidation through mergers and acquisition has really happened.

As both the industry and the foundational technology has matured, the big shift driving a wave of acquisition activity has been a move into the space by deep-pocketed investors from venture capital and private equity firms.

There are two clear patterns at play in North America:

- Companies buying other companies for their customers, installed base, and people;
- Companies buying financially-distressed firms at fire sale prices, or because the owners saw the time being right to exit.

There are several firms, generally backed by investors or bolstered by funds raised as public companies, active in mergers and acquisitions – both before and through the 2020-2022 global pandemic and everything else that happened through that period.

They break down as:

- Software and solutions providers;
- Integrators and distributors.

The first big acquisition – and arguably still the biggest for software – was Dayton, OH-based Stratacache buying Scala. The Philadelphia-area company was the most dominant company in digital signage in the 2000s, but for a variety of reasons its market share had slipped by 2016.

Unlike a lot of M&A deals in the sector, this one was self-funded by Stratacache CEO and founder Chris Riegel, who first bought majority control and then 100 percent in 2018. Riegel has since gone on to acquire Real Digital Media, a small Florida-based CMS company, Montreal's X2O Media, which does both digital signage and remote video education, and a Finnish computer vision firm, Walkbase.

Also self-funded, the New Jersey-based systems integrator Diversified has been building its footprint in the US and Canada, and increasingly internationally, though the acquisitions of smaller, generally regional service providers. Diversified's annual revenues are now $1 billion, though only a portion of that is digital signage-specific.

Main rival AVI-SPL has also grown its footprint via acquisition, merging in 2020 with a Top Three rival, Whitlock. However, that blended company has not, until recently, been very active in digital signage projects.

The companies that warehouse and sell hard goods in the ProAV sector have also been very active in mergers. Exertis, backed by an Irish parent company, has in recent years acquired and rolled in both Stampede and Almo. Years earlier, the distribution giant Ingram Micro bought an AV deployment firm, Rollouts.

The Tulsa IT services firm Sagenet has grown active in digital signage and in early 2021, acquired long-time managed services firm Convergent, which had experienced a series of owners in recent years.

In pure software and services, there have been four companies actively growing through consolidation:

- **Spectrio**: A Tampa firm, that started in on-hold messaging for telephones, has steadily been growing its digital signage business and making that its focus. Its acquisitions have included Codigo (retail banking), Industry Weapon, 10 Foot Wave and Enplug (general offers), Screenscape (SMB), Automobile Broadcasting Network (dealerships), and most recently, Ping HD (food services). Spectrio also acquired the digital signage publication Sixteen:Nine in 2021.

- **Uniguest**: The Nashville company's origins are in providing and managing on-premise business centers for hotel chains, but found itself being asked by clients about adding digital signage services. It developed its own software, but then opted to refine and expand capabilities through acquisition. It has, in recent years, acquired the UK software firms Onelan and Tripleplay, the senior living interactive tech firm Touchtown, hotel-focused Janus Displays, senior living software provider Sagely, voice software firm Volara, and the LA-based CMS UCview. In May 2022, Uniguest announced the acquisition of Norway's Otrum AS and the hospitality business unit of the French firm CPI Global.

- **Creative Realities**: Kentucky-based Creative Realities is a publicly-traded firm that focuses on retail digital signage. It first got attention as it was blended with the deployment firm Conexus World in 2015, and then when it acquired the CMS software firm Wireless Ronin. It has since acquired cinema and QSR-focused Allure (from Christie Digital), and most recently, Dallas-based Reflect Systems, one of the oldest software firms in the U.S. industry.

- **Raydiant**: San Francisco start-up Raydiant is the newcomer in M&A activity, backed by more than $40 million in investment capital. Instead of growing footprint through acquisition, the company has instead been rounding out its offer – acquiring Hoopla in 2021 to bolster its workplace communications capabilities, and then last year, the Dutch computer vision firm Sightcorp.

It's very likely there will be many more acquisitions ahead. While the digital signage opportunity "pie" is much bigger than in the past, there are still too many companies trying to get a slice of that pie.

As with any emerging industry, digital signage will gradually settle to a few main players, and a variety of specialists.

DISPLAYS EMEA

The Pressure Eases

The pandemic disrupted display production, also for top manufacturers. But slowly, supply is returning to normal conditions.

Florian Rotberg

The Top 3 of the European display market are still the same companies as in previous years. Samsung, LG, and PPDS are the major large format display vendors with Sharp/NEC ranking fourth. 2021 was one of the most difficult years so far, characterized by supply chain issues and rising prices. Demand across EMEA picked up much faster than anyone had expected. All the while, the pandemic played havoc with logistics, starting with the Suez Canal incident with thousands of professional displays being trapped in containers on the stranded Ever Given vessel. The supply chain did not recover for weeks.

Distributors and integrators desperately fought for every screen they could get a hold on, which led to a never seen delay in rollouts across continents. The industry overordered in their despair to obtain the required hardware. Towards the end of the year, supply and demand balanced themselves out but many integrators still stockpiled hardware, worrying they would not be able to provide the necessary products.

Photo: invidis

Display by Samsung, the EMEA market leader

Display from PPDS

Photo: invidis

In EMEA, the year ended with a 26 percent increase in units and a 34 percent increase in value, reflecting the post-pandemic boom and increasing prices. Throughout Europe, market development was very uneven: While DACH, UK/Ireland, Italy, and France grew by more than 40 percent, other regions like the Nordics (less pent-up demand), Benelux, Spain and CEE grew below average. Being a project business, limited availability of hardware most likely skewed the picture for the digital signage industry in 2021. The economic recovery throughout EMEA remains unevenly distributed in 2022. In addition, the war in Ukraine and the energy crisis are starting to have an impact towards the end of the first half of 2022.

In stark contrast to 2021, product availability recovered in 2022. Quite the opposite: Distributors and integrators had stockpiled and now cannot get displays out to the customers fast enough. Media players, however, are difficult to source because they require currently missing building materials. This is delaying store construction and renovation, and subsequently also digital signage projects.

An additional trend is easing the pressure on the supply chain. More and more display vendors are moving manufacturing away from China – still widely affected by lockdowns – to neighboring countries, for example Vietnam, but also closer to the market, to Turkey or CEE.

Professional screens usually make up less than 10 percent of the production capacity at Samsung, LG, and other manufacturers – most of the displays produced are consumer TVs. The consumer electronics industry experienced a boom during the pandemic, as private households upgraded their TVs. Production capacities were shifted towards TV but the market is retracting in 2022. The industry is refocusing on professional displays which should help to limit the price increases driven by a strong USD, inflation, and exploding shipping costs.

While large format displays are the bread and butter of digital signage, LED and especially MicroLED are the rising stars replacing video wall displays.

Top 3 LFD EMEA Manufacturers 2022

COMPANY	MARKET SHARE
1. Samsung	34 %
2. LG	14 %
3. PPDS	7 %

Disclaimer: All data are based on reports by the companies or estimates of an advisory board.
Source: invidis consulting GmbH, company informations

Large Format Displays 2021: Strong post-lockdown rebound

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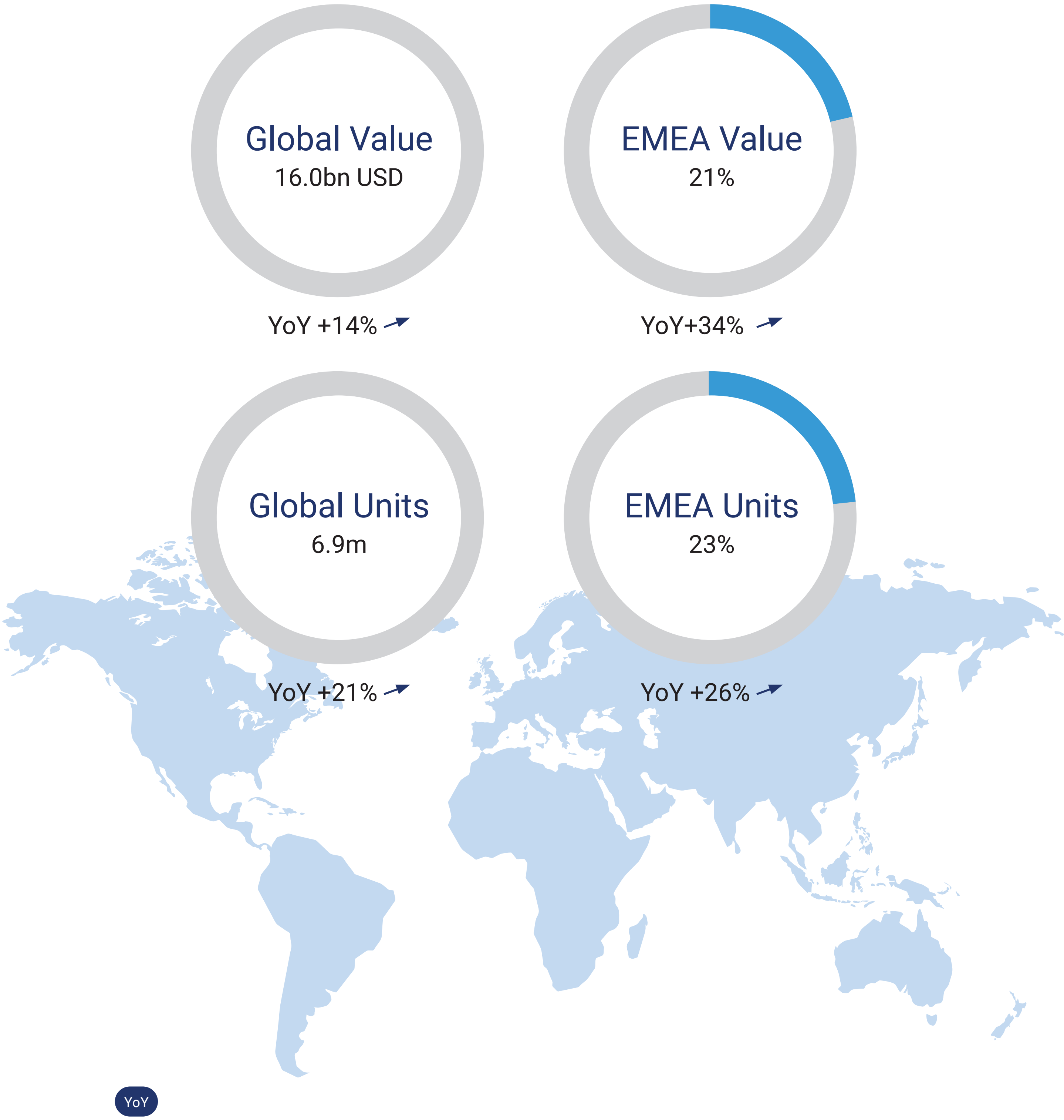

Source:
2022 Futuresource
2021 Figures
(Professional Screens >32")
YoY: 2020 vs. 2021

EMEA 2021: 1,6 Mio. LFD
YoY Growth +26 %

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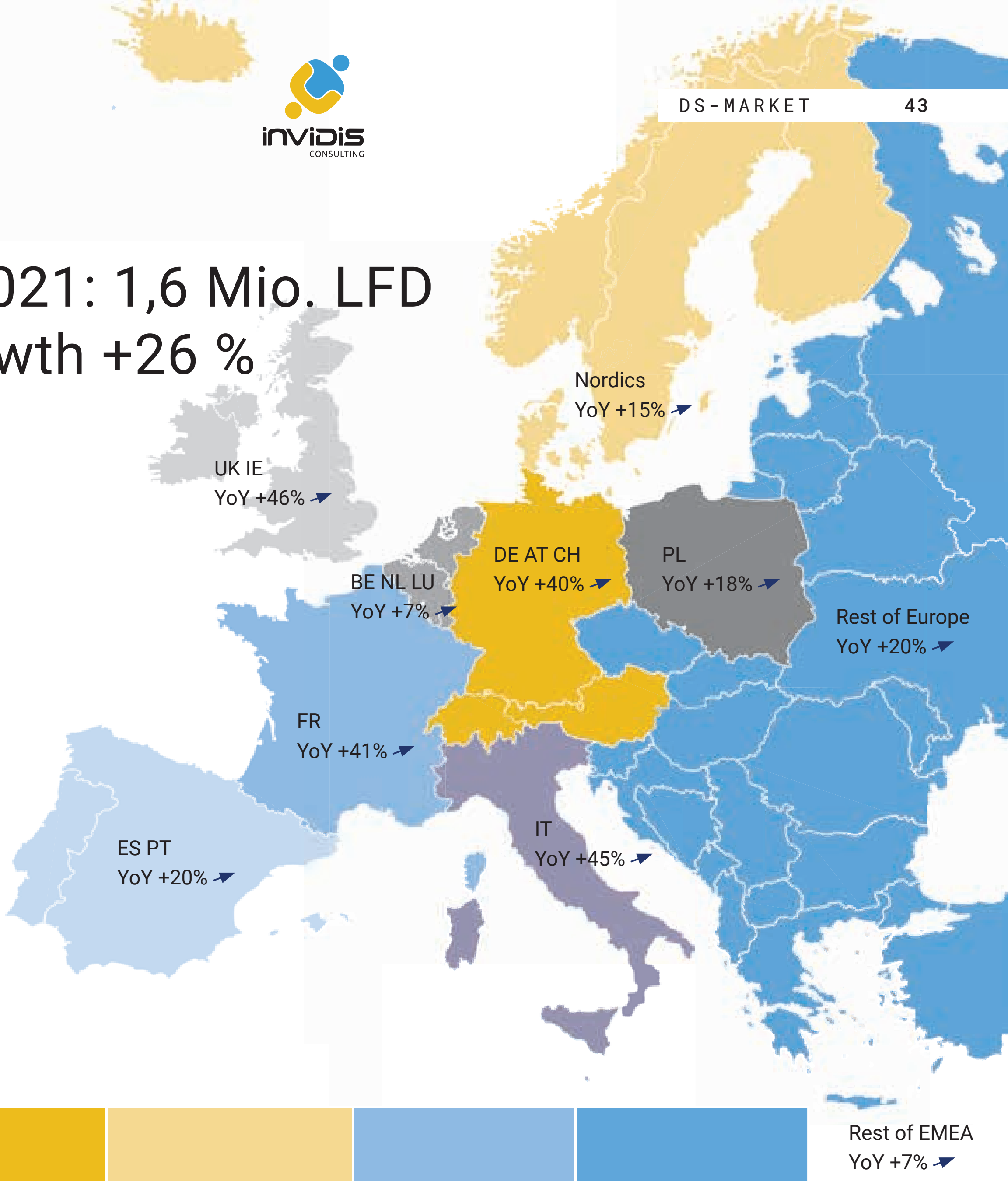
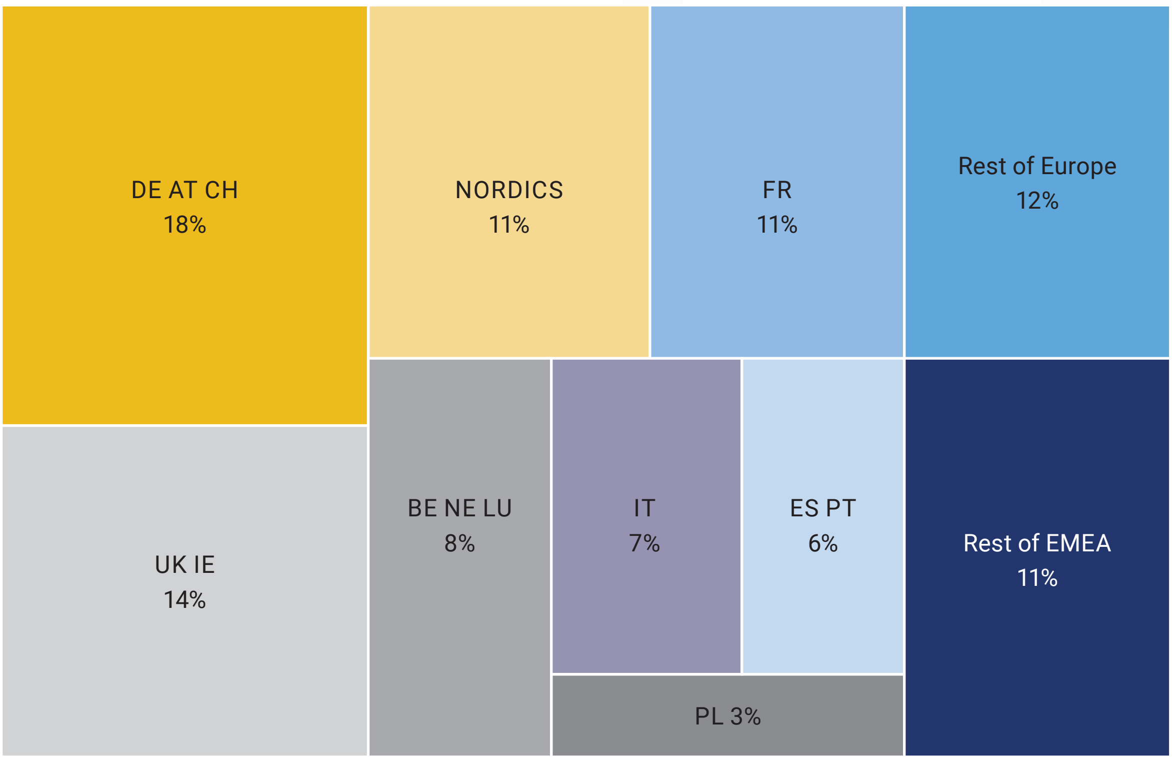


YoY

Source:
2022 Futuresource
2021 Market Share in Units
(Professional Screens >32")
YoY: 2020 vs. 2021



EMEA Market Shares

Note: All figures are based on reports from companies or on estimates by an advisory board
Source: invidis consulting GmbH, company informations

With the platform Scala, Stratacache has largest installed base worldwide.

Photos: invidis

DIGITAL SIGNAGE SOFTWARE

The Global Platform Game

Our detailed global ranking of software vendors illustrates the number of licenses. This, however, is not the only factor to measure the success of a digital signage platform.

Florian Rotberg

Since its beginnings 20 years ago, the digital signage market has been flooded with CMS solutions. ISVs used to offer a specific CMS for each country and each vertical market. invidis research produced a list of more than 1,000 different CMS vendors. With many ISVs exiting the market and new ones entering, it is impossible to keep an exact overview. But in recent years, a few relevant players have emerged that are gaining more and more market share. The list of the most relevant global digital signage software vendors can be reduced to less than a hundred platforms.

The Next Shakeout Is Already Underway

The changing customer requirements and the new cloud-based standards are currently shaking up the market. Many smaller ISVs will not be able to finance the shift to the new future-proof API-first service cloud architecture. Even some of today's leading ISV platforms still operate on a legacy software architecture and will be struggling to make the shift in the coming years.

Place 3 of the Ranking goes to Navori.

In contrast to the integration business, software is scalable and can build up a global user base relatively easily. But a global business requires a modern high-performance software architecture that can deliver data-driven experiences in milliseconds across the globe. Legacy on-premise-based platforms mostly lack the necessary flexibility and performance.

The Ranking

Each year, invidis research analyses the market. We track current licensing numbers of major ISVs and integrators. With the majority of licenses being sold as one-off licenses, research is often difficult. Only in recent years, the industry has turned to a SaaS/ recurring business model. While the new SaaS market is fully transparent, it is impossible to track which of the old licenses are still in use.

The top three market players (Stratacache, Samsung Magicinfo and Navori) all have a 15+ years track record of one-off licenses. These top 3 undoubtedly have the largest installed base in the world with more than one million licenses each. It can be assumed that only 10 percent of the installed base are real recurring licenses with monthly payments. New projects, however, are predominantly SaaS-based.

→

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The next players in the ranking are Uniguest, FWI, and LG, with an installed base of more than 500,000. Uniguest and FWI also offer non-digital signage licenses for mobile and Smart TV, making it difficult to separate the numbers of the different models. LG, like Samsung, bundles CMS license with hardware in selected markets – sometimes making revenue streams difficult to identify. In 2021, Samsung introduced a full cloud-based SaaS solution which is gaining momentum.

Ranks 7th to 14th are traditional ISVs with a transparent active userbase. Broadsign has become the global DooH standard, offering much more than just a CMS. But the Canadians – the SaaS industry pioneers – run more than 200,000 large format screens and LEDs across the globe. CRI, Spectrio, Appspace, and Vertiseit have all merged with competitors in recent years while Telelogos, Easescreen, and MDT have grown organically.

The list of platforms that currently have less than 100,000 active touchpoints is extremely long. Most of these licences are installed in the ISVs' home markets. Some exceptions are Spanish ISVs Deneva, Nsign-tv, and Waapiti, who all have a sizeable business in Latin America. Signagelive and Intuiface are probably the smallest ISVs that are internationally successful thanks to a modern software architecture and a global sales footprint. More and more integrators use their own CMS platforms to benefit from the rising role of software in projects and to gain strategic lock-in with clients. While changing an integrator is relatively easy, moving to a new software platform is a more complex affair.

invidis CONSULTING

The Global Ranking of DS Software Vendors

July 2022

invidis.com

1m+

1m+ licenses

1. Stratacache (US)
2. Samsung Magicinfo (KR)
3. Navori (CH)

500k+

500k+ licenses

4. Uniguest (US) – Onelan, Tripleplay
5. FWI (US) – FWI, Populo
6. LG Supersign (KR)

100+

100k+ licenses

7. Broadsign (CA)
8. Creative Realities (US) - CRI, Reflect
9. Spectrio (US) - Enplug, Screenscape
10. Appspace (US)
11. Vertiseit (SE) - Grassfish, DISE
12. Telelogos (FR)
13. Easescreen (AT)
14. MDT (DE)

Less than 100k*

Less than 100k+ licenses

Deneva (ES)
Intuiface (FR)
Nsign.tv (ES)
Signagelive (UK)
Waapiti (ES)

Integrator Exclusive CMS

Coates (AU)
Econocom (ES)
M-Cube (IT)
Mood Media (US)
Visualart (SE)
Zeta Display (SE)

Others

Adobe Screens
Brightsign

* Selection, in alphabetical order

Source: invidis

Software: America Is Calling

In the digital signage market, hundreds of software vendors are competing on both sides of the Atlantic. Instead of fighting for market share in the highly fragmented European market, software vendors are testing their fortune in North America. But the USA has not been the promised land they had hoped for.

"The grass is always greener on the other side" – a recurring pattern in digital signage. CMS providers from Europe see a lot of growth opportunity in the US but usually underestimate how different the market works on American ground.

The overseas market is dominated by a few large integrators for digital signage, ProAV, and retail tech. The largest players are AVI-SPL and Diversified with revenues beyond the billion-dollar mark, followed by Stratacache and Mood Media with sales well into triple-digit millions. Besides these major vendors, there are hundreds of regional and local integrators that generally do not cover the entire US market.

Beyond the realm of flagship stores in New York City, Chicago, or San Francisco, everyday digital signage projects are quite unspectacular and cannot keep pace with Europe. The complex solutions that are created here, are not in demand in the US. This poses the question: Why does the unquestionably large North American digital signage market need European DS software? And this is not even taking into account the issue of showing local presence and providing support structures with a time difference of 6-9 hours.

Greater potential than software customers offer vertical market specialists who successfully serve customers throughout the USA. The connection to industry backend platforms and the mapping of industry-standard processes play an important role here. Typical examples are QSR and DooH. However, North American providers such as Stratacache (QSR) and Broadsign (DooH) are already global leaders in this field.

One sales channel that is far more important in the US than in Europe is direct sales (long tail) via websites and call centers. This segment of digital signage software is also where the few success stories are written. The best example is Intuiface who set the benchmark in all things, customer acquisition, community, and service structure. Toulouse-based Intuiface generates more revenue in North America than in its European home market. Essential for this success was their own large office in the US. The long tail business in the USA is covered by many different providers – Spectrio has been particularly active here for the past two years, drawing attention to itself through a series of acquisitions, including the celebrated DS startup Enplug.

At first glance, the long tail segment is tempting because of higher license prices. However, after deducting the high customer acquisition costs and the generally small projects, the potential is considerably less attractive. North America can be a very interesting market, but it requires people on the ground, expertise, and capital. After all, developing overseas markets is not a cheap affair. Plus, many of the competitors are well endowed with capital thanks to private equity.

At the same time, North American suppliers face similar challenges Europe challenges the other way. With 22 different languages in the EU alone and many different regulations, the European market is undoubtedly more complex.

EUROPE'S INTEGRATORS

High Revenue, High Goals

Despite all the external challenges – from the Corona crisis to delivery problems – Trison, M-Cube, and Zeta Display have had a good start to the new year and are optimistic about the future.

Florian Rotberg

The pandemic, the war in Ukraine, and delivery shortages: The past year was not an easy one for Europe. But the three largest European digital signage integrators emerged from the global crisis as winners. Trison, for example, increased its revenue by 40 percent, reaching annual revenues of 60 million Euros. This year, Trison plans to continue growing at a similar speed, as Trison CEO Alberto Cáceres revealed: "In April alone, our team executed 400 digital signage projects."

Alberto Cáceres (Trison), Manlio Romanelli (M-Cube) and Per Mandorf (Zeta Display) at the invidis Executive Lounge 2021

The integrator with European subsidiaries in Spain, France, the UK and Germany as well as overseas branches in the Middle East, North- and Latin America, and Asia has already been able to win new major deals with globally active customers. The Trison CEO did not want to reveal any names yet. "We are focused on globally active customers – that makes us more crisis-resistant in challenging times like these." Trison too is affected by the war in Ukraine and the Western world's boycott of Russia.

Although Alberto Cáceres did not share any customer details, the closing of over 500 stores of Inditex (Zara) in Russia and the Ukraine has surely left an impact also at Trison. Inditex generated nearly 10% of global sales in the two markets in 2021. Porsche, another of Trison's blue chip customers, also withdrew from Russia at the start of the war.

However, Trison is confident that they are well on the way to compensating for the loss of sales with new business deals: "Other markets continue to perform exceedingly well, and we remain committed to our ambitious growth targets."

The current global supply constraints of screens, LED and media players do not affect Trison's daily business as of yet. The integrator already stocked up warehouses more than usual with display signage hardware in fall 2021. For 2022, Alberto Cáceres does not expect any supply chain-relevant project postponements yet. But in La Coruña, like in Malmö or Milan, everybody is driving on sight.

Demand Has Grown

For the Italian integrator M-Cube, 2021 was an equally successful year. "Demand for luxury goods has picked up enormously after the pandemic, and our customers have benefited from the strong demand," says Manlio Romanelli, president of M-Cube. "We were able to increase our digital signage revenue by 27 percent to 46 million Euros, and this figure doesn't even reflect the order intake."

Even compared to 2019, M-Cube recorded organic – as not impacted by acquisitions – revenue growth of 23 percent last year.

For 2022, M-Cube expects the growth to be even higher than in 2021. The impact of the war in Ukraine for M-Cube is manageable, even with the closure of luxury boutiques in Russia. The worst-case risk is a very low six-digit amount, according to Manlio Romanelli.

However, the still limited availability of digital signage displays, LEDs, media players and other hardware could have a greater impact on business development. The supply bottlenecks already restricted business noticeably towards the end of 2021. "It looks like our industry will be severely affected by supply chain issues at least until the end of the year," says Manlio Romanelli. Fortunately, he says, M-Cube has exclusive access to LED products through its specialized subsidiary Videomobile.

Zeta Display, based in Malmö, southern Sweden, was acquired and delisted from the stock market in 2021 by London-based private equity firm Hanover Investors. Even before the acquisition, Zeta Display was a driving force in European market consolidation. In September 2019 Per Mandorf joined as CEO. Since then, he focused on integrating the acquired companies in the Nordics, Benelux, and Germany into a single group structure.

"We serve many of our customers internationally, so products, services and our go-to-market strategies need to be aligned," says Per Mandorf in an invidis interview. A new organizational model is supposed to enable Zeta Display to serve customers with the same quality in a customer-centric and scalable manner worldwide.

Per Mandorf – who comes from the retail software business – puts great emphasis on the joint digital signage software platform Engage. The new software platform was not developed completely from scratch but builds on several existing group-owned CMS platforms. Overall, the CEO believes Zeta Display is well positioned to enter the next phase of growth.

Fourth Force in Europe

Photo: Stratacache

Stratacache-CEO Chris Riegel

Stratacache/Scala is based in the USA, but also plays an important role in Europe. According to CEO Chris Riegel, sales performed well during the pandemic. Similar to other large fully integrated digital signage vendors, Scala was able to rely on recurring monthly software revenue and ongoing service contracts during the crisis. For the current year, CEO Chris Riegel expects Scala to break the 100 million Euro revenue mark worldwide for the first time.

Since the beginning of the year, Scala has also recorded an increase in demand in Europe. Even though the major scaling effects of North America have not yet been achieved in Europe, Scala's European digital signage business will be profitable again this year.

Chris Riegel sees the Stratacache Group on the right path: "We're back to pre-crisis levels and plan to grow by 15 to 20 percent this year." Stratacache intends to benefit from further market consolidation and sees itself well positioned with its broad, digital signage complementary offering.

Fred D'Alessandro and Eric Hutto co-lead Diversified.

US INTEGRATOR

Merging Two Worlds

With $1b USD in sales revenues, and a growing global footprint, Diversified sees opportunity in the convergence of AV and IT.

Dave Haynes

Fred D'Alessandro had a choice to make – spend his working days around TV pitches for non-stick frying pans and cubic zirconium necklaces, or quit that gig and start his own company.

He chose the latter, leaving his broadcast engineer job at a TV station acquired by the Home Shopping Network and in 1993 starting the pro AV integration company Diversified. Over some three decades, a home garage operation that started out doing TV tower maintenance, studio builds, and anything else that paid the bills has become a $1 billion annual revenue AV IT systems integrator.

Diversified now has about 2,700 employees worldwide, with 35 offices across the U.S. and a growing global footprint of 17 international offices, from next door in Canada to a newly opened office in the Indian tech hotbed Bangalore. About 80 percent of sales are domestic.

ProAV is Changing

The company has grown both organically and through a series of acquisitions, including the U.S. firms HB Communications and Sensory Technologies, and in Australia, Rutledge AV.

Integrators of all sizes now offer some capabilities in digital signage, but New Jersey-based Diversified has arguably been far more engaged and active in the sector than its largest competitors, particularly in its primary market – the United States.

The digital media wing of Diversified has subject matter expertise and services that start at the ideation stage and run all the way through to ongoing management – including uptime monitoring, content scheduling and creative. Earlier this year, the company also formalized in-house financing for AV projects, calling it Global Payment Solutions.

D'Alessandro has guided the company's growth since its earliest days, but in March 2022 announced he was bringing on IT services veteran Eric Hutto as CEO. While Hutto will run the day-to-day of Diversified going forward, and drive new growth. D'Alessandro is remaining active as

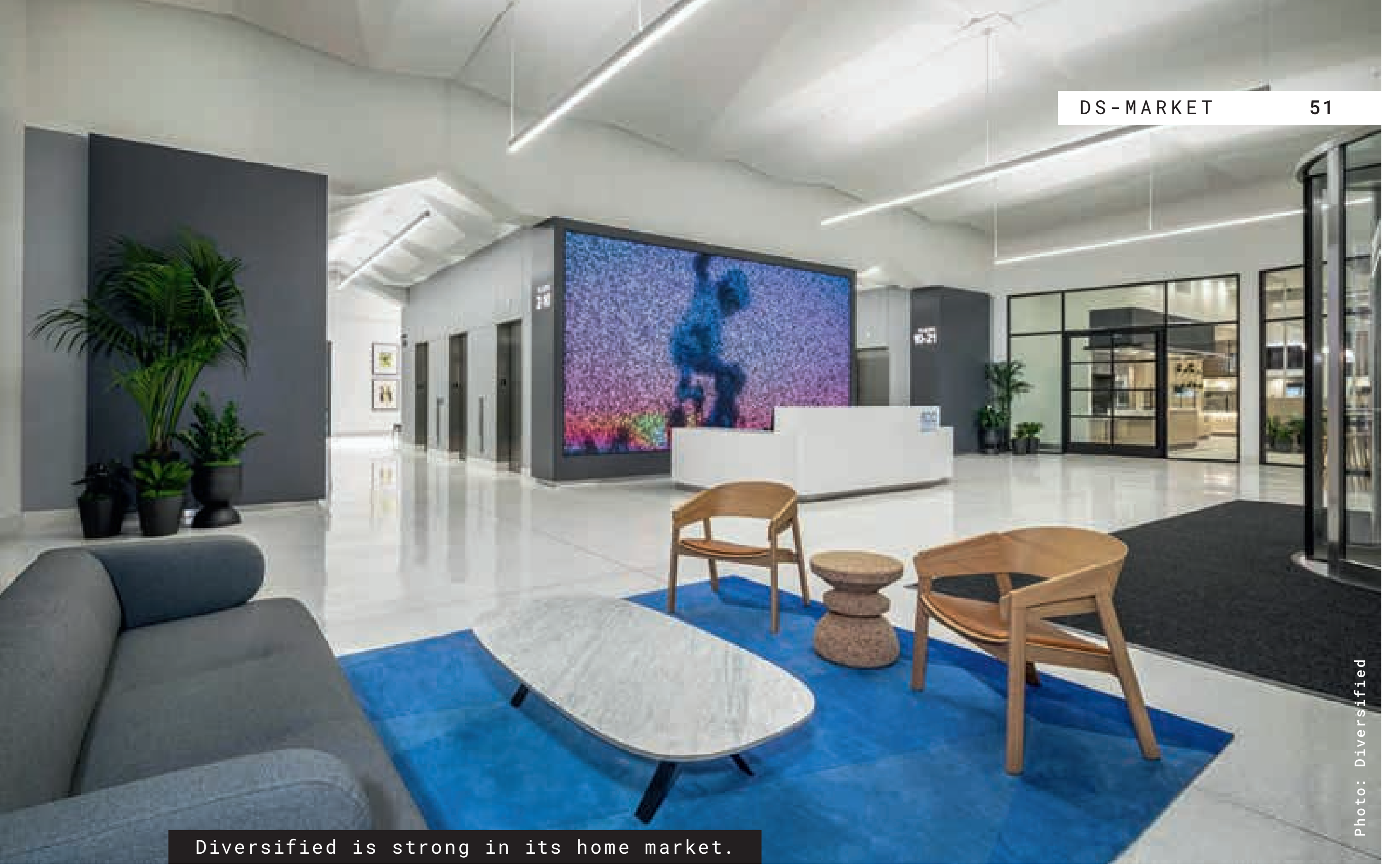

Diversified is strong in its home market.

Photo: Diversified

Executive Chairman, focused on strategic relationships and mentoring company talent.

Bringing on Hutto reflects the changing nature of professional AV, which is in the midst of a long-expected convergence with information technology. Connectivity and supporting infrastructure have long been core to digital signage networks, but contemporary projects now often factor in technologies like streaming video, and involve integrating with a variety of business and building systems that can inform, shape and trigger messaging. As endpoints on networks, IT security expertise has also grown critical.

IT and AV are Merging

Hutto has come over from the big, Dallas-based IT services and consulting firm Unisys, where he was President and COO. Hutto brought almost two decades of executive-level experience and a background in integrating acquired companies, improving operations and boosting sales performance.

The global pandemic that started in early 2020 just accelerated that AV/IT convergence, Hutto suggests. “We all got sent home. So if you think about the audio video quality of calls and the ability to keep things running, it is a bit different now, and that forced people to get more educated, appreciate more of the components that go into it, versus just servers and storage in clouds.”

“It has merged with the IT industry over 30 years,” Hutto continues, “and has just been completely collapsing all the stacks of technology.”

Outsourcing is What’s Wanted

“So I do think it is the natural progression to take all the sophistication that Fred and his team have built around how to create a great experience in places like a stadium. But now we move beyond that, to what's coming into the stadium, and how do we keep that under control? Because bandwidth and those things affect the quality of the experience.”

What’s also bubbled up in recent years is an increased customer-demand for outsourcing, effectively handing off much of the technology need to third-parties with the available resources and domain expertise. In simple terms, big companies can focus on what they’re good at, and in the context of IT, on primary concerns like business systems and cyber-security.

The new in-house financing launched recently by Diversified adds to extensive services already

Customer requirements have also changed in stadiums.

in place. The company offers everything from deployment and break/fix to remote monitoring and diagnostics, and content management.

"I do think that clients are realizing, especially on a global scale, they want to have a single partner that can provide the various solution sets," says Hutto, "and I think Diversified is the only company in the world, honestly, that has the portfolio of offerings. And then it's managing for the clients, all these different technology platforms and services. We've seen a tremendous uptick in that requirement, and in the 'ask' of clients."

"So many customers don't have the staff that can actually operate or maintain the technology," he adds. "So that's a big growth area for us, for sure."

However, Hutto notes the importance of relationships and sticking to strengths. "One of the things that I've learned over 16 years in IT services is that it is a relationship, and that relationship is trusted. You don't get to be a trusted partner advisor if you're making decisions that are oriented towards yourself."

Rethinking the Workplace

"It's always been outcome-based," he says of Diversified's approach, "and I do think that it gets hard to be the best at every single component of the solution, because it's so complicated these days. There's so many things that you have to consider."

In the context of digital signage, that means working with external creative and design firms, and using multiple content management software platforms – giving customers and staff multiple options that meet different needs from functionality and scale to budget constraints.

Along with the pandemic greatly elevating demands for AV solutions in core and remote workplaces, two-plus years of life with Covid-19 has also exposed demands and opportunities to rethink workplaces and communications in them.
"When I was still at Unisys, we didn't have everybody coming back to the office yet, but as they started to come back, what kind of office was it," says Hutto. "And really, what people need is collaborative spaces, where they can come, engage, connect, get things done, and then move on. I think that's a huge opportunity for us to, again, help them think through the design of what it is they want to achieve with their associate base, when they do come back."

"We see a lot of digital signage and IPTV opportunities in warehouse workplaces, because corporate communications is key," adds D'Alessandro. "That's one of the things that we learned, especially during the pandemic, of how important communication is. So I think companies going forward will need to step up their game, to make sure that everybody is connected, because everybody is not always in the office or in the warehouse these days."

Global Expansion

Long a U.S.-only company, Diversified has in recent years started expanding globally, mainly through acquisition of firms with established footprints and client lists in different countries. Some of that reflects growth opportunities in a climate of consolidation, but D'Alessandro says international expansion also owes to meeting the needs of customers who operate in multiple countries and regions.

"That's a saying that we've had in a company a long time: make it easy for our customers to do business with us," says D'Alessandro. "Being able to work and have established entities in these various countries, customers are able to buy in the country, we're able to transact in the country for them, and you just avoid a lot of the inefficiencies that you get when you're trying to do things from just the U.S."

"Just like a lot of companies in IT, you get taken to places by clients, right," adds Hutto. "So you have to be able to operate where the clients took you. Over time, we're going to have our competencies and our direct associates, if you will, but there'll be markets that we're choosing to be in because we see the growth in them, versus we got taken there by a client. But we will always have the ability through partnerships and other relationships to service a client, wherever they need to be."

Growth, particularly stretching across time zones and continents, comes with challenges, making it important to be prudent, notes D'Alessandro. "It's not so much about how big we are. It's just really continuing to be the best, as we get bigger."

Project example from Diversified

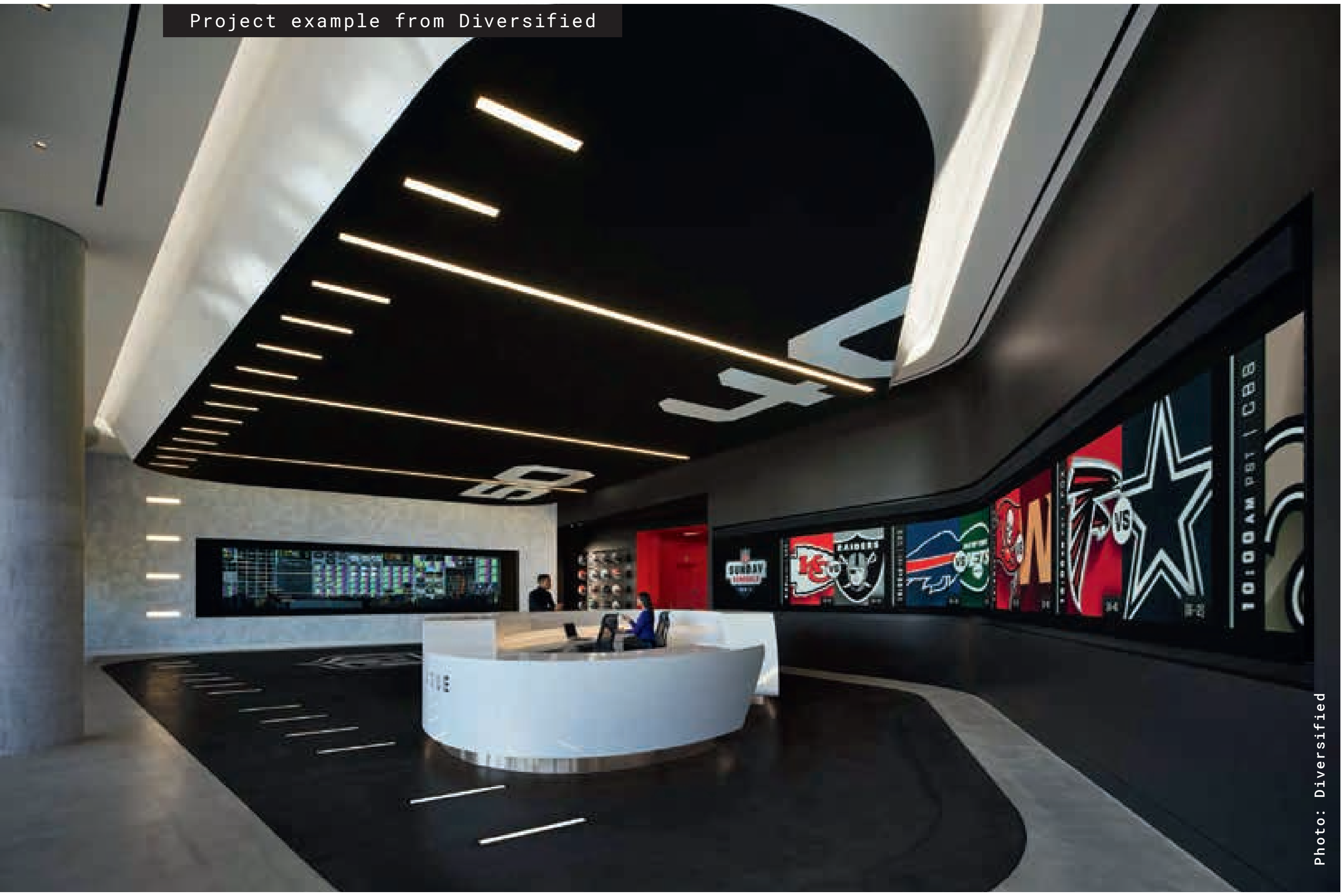


Photo: Diversified

SEARCH FOR TALENT

The Race Has Begun

The digital signage industry will only be able to continue its growth trajectory with the right people on hand. Finding talent is becoming more and more of a challenge – and it will become more difficult.

Balthasar Mayer

When the digital signage industry reconvened again in 2022, after permanent lockdowns and virtual events, there was one topic that surfaced in any conversation: the shortage of staff. Talented employees are missing everywhere.

The search for developers has been a problem for years, but technicians and sales staff were never rare – until the pandemic began. Now, the demand for talented digital signage experts has grown exponentially. Particularly evident is the shortage in the DACH region, but also in Scandinavia and Southern Europe.

The search for proven experts goes even further. Office staff, warehouse workers, and especially trainees: Companies are looking to fill almost every position with motivated personnel. Particularly on the apprenticeship market, they have been complaining about a shortage of applicants for years – at least of those who meet certain minimum requirements in terms of motivation and aptitude starting with basic communication skills.

No Insurance Against Staff Shortage

While smaller, more traditionally oriented industries have been feeling the shortage of skilled workers for some time, the digital signage sector never felt severely affected. Being such a modern and exciting industry felt like an insurance against the problem. But in the end, digital signage companies looking for staff are competing with other technically oriented industries. Especially larger corporations are a serious competition because they put more emphasis on self-advertising and are more firmly anchored in the minds of young people when it comes to their future career choices.

Learning from other industries

The ultimate wake-up call for the DS industry was an alert from another industry: in early 2022, the German communications agency association GWA announced that German agencies were short of thousands of employees. The association estimates that the number of missing staff and the associated challenges will grow in the coming years.

Skill is needed

An attractive, modern industry that used to have no problem attracting talent willing to work is struggling massively with a shortage of personnel: Even if it is partly due to agency structures that have grown up and are no longer up to date, it is clear that the battle for talent has long since begun. In addition, it shows that the need is no longer limited to technically trained specialists: In the future, capable employees will also be difficult to recruit in fields such as communications and project management.


The digital signage industry needs to solicit young talent.

Photo: ISE

Many managers instinctively assume that economically challenging times will cause a rise in competition on the job market. The Corona crisis, however, showed that this assumption is misleading. Demographic data and other factors suggest that there will not be wave of specialists flooding the market, even in the difficult times ahead due to the global situation.

A lack of employees is a challenge for any industry, but in the digital signage industry, which is growing at an average rate of 10 percent, staff shortages are a disaster – not to mention measures to compensate for the lack of diversity. Competing for the best talent will remain a top priority on the CEO agenda this year and the next.

WOMEN IN AV

“Many Lack the Confidence to Lead”

Michaela Hirsch from Peerless AV co-founded the DACH group of the Avixa Women's Council. She describes which phrases female executives still hear too often and how the entire industry can benefit from a higher percentage of women.

Balthasar Mayer

Invidis: Michaela, what inspired you to co-found the Avixa Women’s Council DACH?

Michaela: Last year, Simone Freund from Legrand AV, Nicole Kowalski from AVI-SPL Germany, and I had the general idea to become active in this field. We asked around to see how we could best get involved. Finally, we came across the Avixa Women's Council, and in December 2021 we founded the DACH group.

Photo: privat

Michaela Hirsch is Director Sales Germany of Peerless-AV EMEA.

Was there a certain event that made you decide to get involved?

I myself have never felt unjustly treated. But there were many small things that occurred in my surroundings and added up. For example, when you hear a female executive being asked: Do you really have to do that when you have a husband who makes enough money? And during meetings, it is mostly the women who are sent to get coffee.

What is your take on the proportion of women working in AV?

I have been working in IT since 2000, and in AV since 2014. And I have to say: In IT, the male-female-ratio is pretty balanced. In AV, on the other hand, the percentage of women is incredibly low. You see that at events where we women instinctively form groups. Because there are so few of us.

There are probably even less women at C-level, right?

Correct. There are many reasons for this, as I see it. Women, for example, tend to gravitate more towards assistant roles. Many lack the confidence to lead.

What are your goals with the Avixa Women’s Council?

Our founding trio complements each other very well. I personally want to help women in our in-

Simone Freund of Legrand AV, Michaela Hirsch of Peerless-AV and Nicole Kowalski of AVI-SPL Germany are the founders of the Avixa Women's Council DACH.

dustry become more confident. Nicole mainly focuses on creating a networking space. Simone strongly cares about the next generation. This is how we are able to address women – and men – with different goals.

There are also men in the Women's Council?

Yes, and that was very important to us! After all, we do not want to play women out against men. We want to have conversations and offer women support. For the benefit of the entire industry. In the end, the industry we represent is diverse and multifaceted. So everyone is welcome, regardless of gender.

How many members does the DACH group have?

Currently, that is May 2022, we are just under 70 members.

In May 2022 at the ISE, you held your first ever council meeting. How did it go?

The meeting was well attended – but most importantly, everyone was able to really get to know each other for the first time. And discuss the topics that are important to us as members. Especially the panel discussions created a lot of momentum. For example, there was a discussion about whether Avixa should offer special CTS training just for women. The idea was applauded by many.

What are your next concrete goals?

For now, we are focusing on getting the word out and recruiting members. An experienced consultant recommended that we take things slowly. If you take on too much and don't get it done, you'll be disappointed, and the project will be in jeopardy.

What can you – and the industry in general – do to give women more visibility?

We need to teach managers, which are mostly men, to recognize and promote potential female leaders. People are more likely to promote other people who are similar to them. And it's our job to make it clear: Women lead differently, but not worse.

What about the work with young talent?

Another important point. In the long run, we plan to visit universities and schools. We want to introduce young women to the AV industry and show them how fascinating engineering can be. If we can manage that, the entire industry will benefit. With today's shortage of personnel, no industry can afford to spare half of its talent.

The Avixa Women's Council

The Avixa Women's Council aims to support and promote women in the technology and AV industry. The local groups in Europe, the UK, Italy, and Germany meet regularly for networking and mutual support. The focus and goals of the respective groups differ – depending on local and country-specific needs.

GREEN SIGNAGE

Things DS can Learn from IT

Sustainable product design and refurbishment: How companies like Dell and CHG-Meridian are showing the digital signage industry the next possible steps in becoming more sustainable.

Florian Rotberg

Green signage has been one of the major B2B trends in the digital signage industry, and not just since the pandemic. Corporate customers along with more and more small and medium-sized enterprises are looking for sustainable digital solutions. Most green signage concepts focus on reducing the carbon footprint. Either by reducing power consumption, which is responsible for 80 percent of emissions, or through CO2 certificates.

But reducing carbon emissions is only one aspect of sustainability. According to experts, the biggest chance signage has to become greener is through the careful use of resources. This is best achieved through longer lifespans and recycling. After all, displays and IT hardware contain rare earths and precious metals that should be used sparingly.

IT companies are increasingly concerned with sustainability. For products that are produced millions of times over, even small savings can have an effect. Dell is one of the companies to follow this approach: Together with Intel, a proof-of-concept was created with Concept Luna. It explores design ideas that would make components immediately accessible, replaceable, and reusable – thus reducing resource consumption and keeping more recyclable materials in the economy.

Sustainability in Bullet Points

The six key areas for sustainable action in the IT industry, according to Dell:

- Optimized energy efficiency
- Environmentally friendly resources
- Closed cycles
- Easy maintenance
- Longer lifespans
- Alternative supply models

Easy Maintenance

Product design plays an important role here. Previously, for example, hundreds of different screws were necessary to access internal components for repair or reuse. Now, all maintenance and recycling processes can be handled with only four screws. This reduces the time needed for disassembling, repairing, and reassembling major components by about one and a half hours.

New materials can also make production more resource-efficient: Bio-based motherboards (PCBs) are made with flax fibers as the substrate and a water-soluble polymer as the adhesive. The flax fibers replace conventional plastic laminates.

Through recycling, electronic items are turned back into raw material suppliers.

Photo: Dell Technologies

The water-soluble polymer dissolves during recycling. This makes it easier to separate metals and components from the mainboards, facilitating the process.

The Concept Luna is currently nothing more than a concept. But future generations of IT products will have to be more sustainable – the same goes for displays and LED modules.

Promising Refurbishment

Conserving resources also includes longer initial and regular secondary recycling. Technology organizations such as CHG Meridian are systematically concerned with increasing lifespans and remarketing mobile goods, such as digital signage displays, PCs, or ESL labels.

The company based in Weingarten has been financing capital goods for many years – from IT electronics, medical equipment, and industrial technologies to digital signage hardware. The demand for sustainable concepts is growing. “However, they also have to be economical. With our circular economy model, we conserve important resources and, at the same time, create cost advantages for our customers,” explains Sebastian Trabold from CHG Meridian.

This is another example of how our industry can learn from IT. Since the pandemic, when new notebooks and monitors suddenly became scarce, interest in used equipment has exploded. It became evident that secondary marketing is already more established for fast-moving electronic products, such as smartphones or notebooks, than for visual solutions. “There is still room for improvement in digital signage when it comes to secondary marketing,” confirms Sebastian Trabold.

One of the reasons is the resistance of visual solution hardware manufacturers display to extend service beyond three to five years. Currently, the average lifespan and thus financing of professional displays is limited to five years. “Digital signage hardware is not a commodity, so we need to extend service and supply spare parts. There should be a market standard and independent verifiable lifespan interfaces.”

As long as only manufacturers and not external service providers can read operating time and other display KPIs, a large-scale refurbished market stays a concept of the future. “The market lacks the awareness for standards.” But it needs to adapt, not only in terms of sustainability but also in terms of current supply problems.

SHARP/NEC

Green Signage is on the CEO Agenda

Less service calls, longer lifespans: Energy-efficient, reliable digital signage solutions not only save resources but are also more customer budget friendly.

Florian Rotberg

Sustainability, Circular Economy, carbon footprint – the agendas of C-level executives have become demandingly diverse in recent years. Still, the digital signage industry cannot yet fulfill the needs and expectations of many large customers sufficiently. Especially in Europe, sustainability has become the major cornerstone of ESG initiatives. Procurement activities are aiming not only for the best value but also for the most sustainable solution available.

The most obvious and most important criterion in choosing the right solution is energy efficiency, as 80 percent of the carbon footprint is produced during operation. For years, extending the lifecycle of displays, projectors, LED, and media players through refurbishment has not been very popular with visual solution vendors. But we are observing a mindset change within industry – with Sharp/NEC leading the pack. The Japanese visual solutions provider was awarded the invidis Green Signage Award for its multiple initiatives towards more sustainable digital signage solutions. Especially premium business-critical solutions like cinema projectors – coming at a minimum price tag of a mid-five-digit Euro sum – are being refurbished regularly now.

Surveillance Means Less Maintenance

Less visible but with an enormous sustainability impact are reliability and service frequency. Unplanned service calls are not only very expensive but also produce a higher carbon footprint than planned, combined trips. With service costs exploding, robust and reliable digital signage solutions have become even more important. invidis expects service costs to rise year-on-year by at least a third until the end of 2022, as transport and labor costs are skyrocketing in the wake of the pandemic. Because screens are becoming larger, service calls require at least two technicians, which means service costs are increasing as visual solutions are growing in size. Although Direct View LED can be easier maintained and repaired because of their architecture, they are generally also more susceptible to service calls.

As more and more customers deploy their digital signage concepts across the globe, worldwide service programs are becoming essential. In the past, many visual solution providers offered warranty services only in the regions where the products were bought. This meant that global retailers often needed to send screens around the world to get them replaced – not really a sustainable concept. Sharp/NEC was the first solution provider with a global customer care program. Others like Samsung followed suit in the meantime.

Moreover, a larger number of premium visual solutions are being repaired now instead of replaced, as was the practice in the past. In addition to repairing LED tiles, which can be easily fixed even in high-cost labor markets in Europe, display panel components are also being exchanged nowadays.

"Preventative maintenance is the key to a reliable solution," is Sharp NEC's philosophy, according to Christof Böhm, Senior Vice President Engineering, Quality Assurance & Service. "Temperature is the worst enemy of electronics, and visual solutions are especially affected under tough conditions."

To assure preventative maintenance, digital signage networks need to be seamlessly monitored by Network Operation Centers (NOC), as is usually the case with all other business-critical IT infrastructure. "The digital signage industry still has to catch up with the IT industry in regards to monitoring and health status analytics."

DS Is Being Challenged

Digital Signage screens are often installed in harsh conditions. A prime example are the outdoor screens at QSR drive thru locations or in DooH. Being exposed to all elements of nature, outdoor screens also need to be equipped with stronger backlighting for the content to remain readable under direct sunlight. The up to 10x brighter screens dissipate an enormous amount of heat waste.

In other locations like fashion stores, display operations can be impaired due to textile fiber and dust. Indoors, among the most challenging environments for digital signage hardware are kitchens (grease and heat) and hair saloons (hairspray and dust).

MARKE
COMPA

Read the story behind
this picture on page 100.

Photo: Adrenorama

THE NEW INVIDIS RANKING

A Compass for the Market

Integrators and software providers are merging, and the global digital signage industry is becoming more complex. A new ranking system from invidis sheds light on the different markets.

Florian Rotberg

As the pandemic fades, digital signage is becoming more mainstream – especially in the workplace, on company campuses, on the shopfloor, and in public spaces. Many of those projects are not designed and implemented by pure digital signage specialists, but by IT solution providers or ProAV integrators. More and more service providers outside the signage industry are discovering the potential of visual solutions in public spaces.

In the past, Fortune 500 tenders already were more and more conducted by global IT solution providers or even professional services firms. While trusted names acted as general contractors, specific digital signage know-how was usually outsourced to industry specialists. As the major global service companies are building their own digital signage expertise, this labor division practice is slowly being replaced by IT departments planning and executing business critical digital signage projects without external integrators.

Our goal for this yearbook was to offer a market overview of the largest global digital signage solution providers. During research, however, determining the digital signage share of the global solution and service providers proved difficult.

Borders Are Dissolving

With more than 1 billion US-Dollar in revenue, Diversified and AVI-SPL are the largest AV integrators worldwide. We estimate their share of digital signage revenue at less than USD 300 million, followed closely by Stratacache. The vast majority of integrators – IT, ProAV, and retail – generate significantly less than the top three on a consistent basis. For our ranking, we prefer to look at hardware and software/services revenues separately.

The digital signage business of IT/telecommunications providers is mostly an opportunistic one. Computacenter, CDW, BT, Orange, Deutsche Telekom, and others offer their customers a wide range of digital solutions, typically as part of their B2B offering. Listed as vendors, large IT integrators and telecom companies have mostly been successful in winning tenders from existing customers. Some of these digital signage projects were among the largest in the industry, others were larger additions to IT and retail projects.

Another category of globally successful providers of digital signage solutions are professional services firms such as Accenture Digital, Deloitte Digital, and architecture firms such as Gensler. Designing digital signage concepts and solutions is usually part of a larger contract and is often awarded to specialists. Gensler, for example, is one of the largest architecture firms in the world and even has its own digital media department.

Why the invidis Compass?

In previous editions of the yearbook, invidis published rankings with the largest integrators, software providers, and others mainly for the DACH market. This year – especially after two difficult pandemic years – we decided to offer the industry a broader market overview. The invidis Market Compass is published for each major EMEA market and categorizes the most important market players into Market Leaders, Main Players, Rising Stars and Generalists.

For our past editions, we strictly separated integration and software. However, this separation is becoming increasingly difficult as integrators offer their own software, and software vendors are acquired by integrators. We are still committed to analyzing every market segment (visual solutions, media players, software, services, accessories) across EMEA and North America. Our next new market overview will be on the Middle East, to be released in fall of 2022.

We will expand our coverage of EMEA and North America with a more detailed ranking in the future. Currently, our database includes details on more than 700 digital signage market players in Europe and North America.

The invidis Market Compass provides orientation.

Photo: Aaron Burden/Unsplash

NORTH AMERICA

The World's Largest DS Market

In the USA and Canada, global ProAV integrators, integrators with a software background and globally known brands dominate the market.

Florian Rotberg & Dave Haynes

The digital signage market in the US and Canada is the largest market in the western world, most likely only topped by China. But as China is dominated by local software vendors and integrators with only a few exceptions, US/Canada are considered the leading market. Not so much regarding sophisticated concepts, but the sheer size and the volume of displays, player and licenses deployed.

invidis and Sixteen-Nine analyzed the North America market for the first time, tracking revenues, active licenses and visual solutions sales. In contrast to the EMEA region, globally established ProAV integrators play an important role in the North American digital signage market. Most prominent the two one-billion-Dollar-plus integrators AVI-SPL and Diversified. In recent years both integrators grew inorganically through multiple acquisitions to leading international ProAV solution providers, offering Corporate AV, Collaboration and complementing solutions. The third largest ProAV integrator, according to SCN magazine, with a just a third of the revenue is Kinly, which is based in Europe.

The Leaders

Focusing on the digital signage market, the leaderboard looks different. Largest digital signage solutions provider in North America is Diversified developing flagship projects as well as large rollouts.

Second largest digital signage solution provider – and in contrast to Diversified a digital signage pure player – is Dayton/Ohio based Stratacache (e.g. Scala). Outside of North America Stratacache is best known for its Scala-branded offering. CEO Chris Riegel acquired Scala six years ago and changed the business model successfully from partner to direct-to-customer. Today Scala offers end-to-end solutions including project design, software, Scala-branded hardware, deployment and operations. Stratacache is the leading QSR digital signage provider in North America, providing drive thru and restaurant digital signage solutions for McDonalds, RBI (Burger King, Tim Hortons) and others. Most notable are Stratacache's current activities in setting up a Oregon-based LED-Manufacturing site scheduled to open end of 2022.

FWI (Four Winds Interactive) is a dedicated digital workplace solution provider offering a wide range of digital signage and mobile solutions for corporates to communicate with staff and visitors. In the midst of the pandemic – in March 2021 – Four Winds Interactive and Ireland-based Poppulo merged to create a global employee communications provider for the new, hybrid world of work. The combined company serves 6,000 B2B customers in 80 countries. Historically, FWI focused on digital signage, wayguiding and interactive kiosk applications while Poppullo offered online and mobile based internal communications software.

Major Players

Additional mayor digital signage solution providers in North America with a software background are Appspace (similar workspace focus as FWI), Broadsign (the global leader in DooH), Korbyt (formerly RMG) and Mvix. Leading digital signage providers with an integrator background are AVI-SPL (top ProAV integrator increasingly focusing also on digital signage), Mood Media (market leader in Instore Music, but also digital signage, scent and mobile), Creative Realities (CRI acquired Reflect in November 2021) and Uniguest (Hospitality signage). As a hardware manufacturer, Brightsign should not be part of our Market Compass, but the company led by Jeff Hastings is much more to the DS industry than a media player vendor. Brightsign provides a very popular commercial-grade operating system on top of its purple boxes.

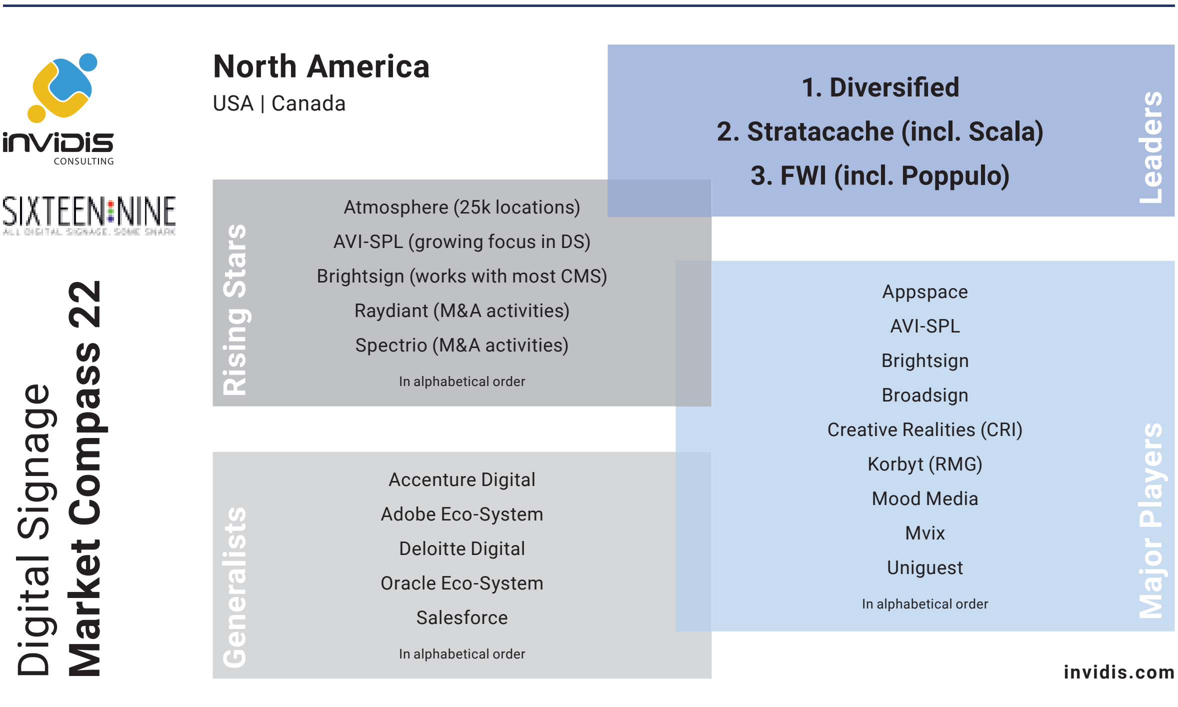
Rising Stars

Repeatedly making the headlines in the past 24 months have been five digital signage solution providers. Two software-focused software companies (Spectrio and Raydiant) are rolling up the North American digital signage market with numerous acquisitions. Tampa-based Spectrio as well as San Francisco-based Raydiant are following a similar long-tail business model strategy. Customer are preferable acquired directly through websites and call-centers. Many projects are of smaller size providing higher average software license revenues than large scale projects. Both digital signage players are driving market consolidation and are most active in transforming digital signage in North America.

Atmosphere is another rising star in digital signage offering an ad-based 60+ channel streaming service to bars and other locations currently playing at more than 25.000 sites. The content streams offer an alternative to live Sports TV and works also without sound. AVI-SPL and Brightsign are also considered rising star as they are rapidly transforming the industry with new solutions, even both are already established players.

Generalists

Many generalists also are playing an important role by offering digital signage or complementing solutions connected to leading business process platforms. Oracle, Salesforce and Adobe are all global leaders with their respective platforms providing services to most Fortune 500 enterprises, similar to the digital businesses of professional service providers Accenture and Deloitte.



EMEA

From Big 4 to Big 8

Trison, M-Cube, Zeta Display and Stratacache are the digital signage heavyweights in Europe. But successful integrators are catching up with the top group, and software companies deliver impressive results.

Florian Rotberg

The European digital signage market is transforming rapidly as more international solution providers are focusing on the region and digital signage. Largest pure-player is Trison followed by M-Cube and Zeta Display – both with almost the same revenues in 2021. Stratacache remains the fourth largest player in this category.

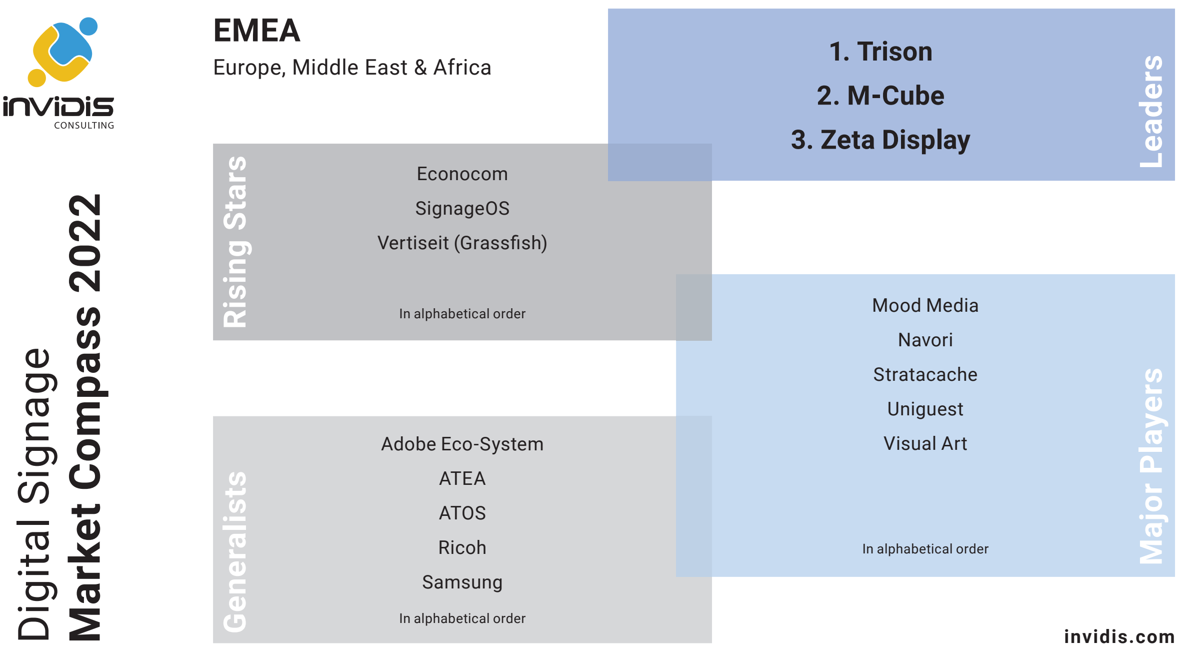
But the leading pack is complemented by Econocom, Mood Media, Vertiseit and Visualart. Four very successful integrators with different growth strategies. Econocom is historically an IT leasing provider with recent investments in digital signage. The international digital signage business accounted 120m EUR in 2021.

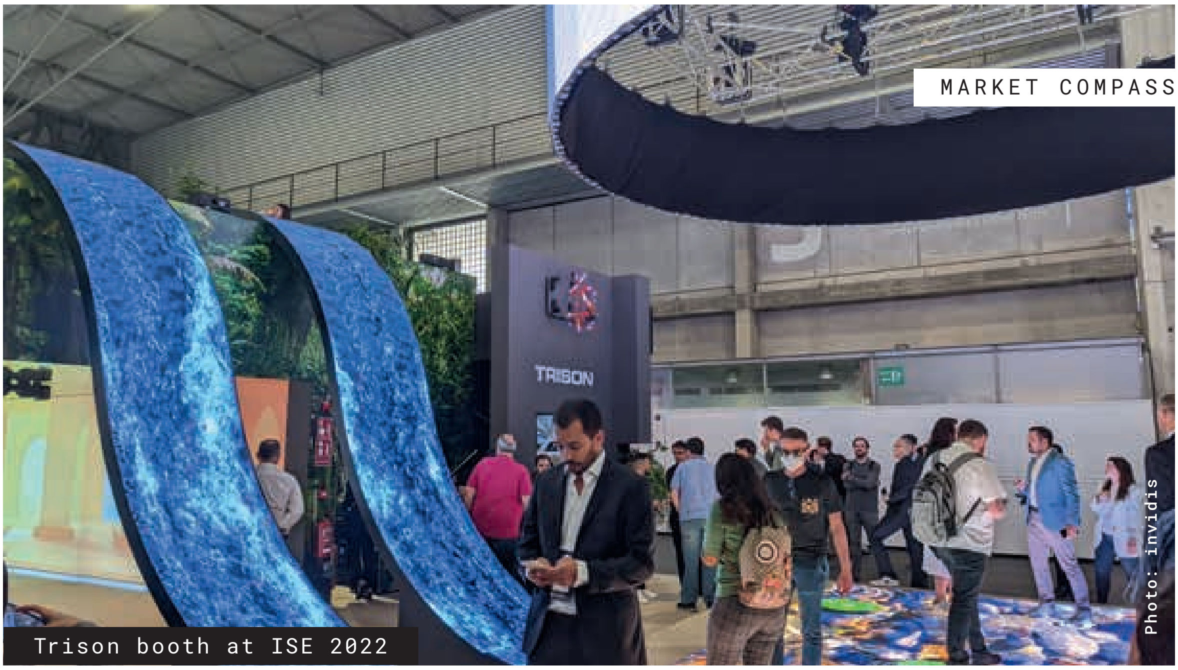
Rediscovery of Europe

The market pioneer Mood Media is rediscovering Europe after the retail-specialist was acquired by a US-investor in early 2021. Vertiseit expands across Europe by acquiring market players with a strong SaaS-solution business while Visualart grows organically after some major pan-European client wins.

Important Software Players

Uniguest – a hospitality tech specialist – has been most active in acquiring digital signage and tech-providers in recent months. Another private





Trison booth at ISE 2022

equity backed enterprise, Uniguest (Tripleplay, Onelan) has shifted its focus also on Europe.

Swiss-based Navori is powering more than 1 million media players with its CMS platform.

SignageOS is disrupting the global digital signage market with its industry-leading middleware, enabling more than 50 CMS platforms to run on 100+ SoC devices with full remote device management capabilities.

Create *powerful* in-store experiences

Dise is the in-store experience management platform for global brands and leading retailers.

Our global partner community bring category expertise to deliver the one digital signage solution designed for in-store, making it more powerful and intuitive to use.

dise

DACH

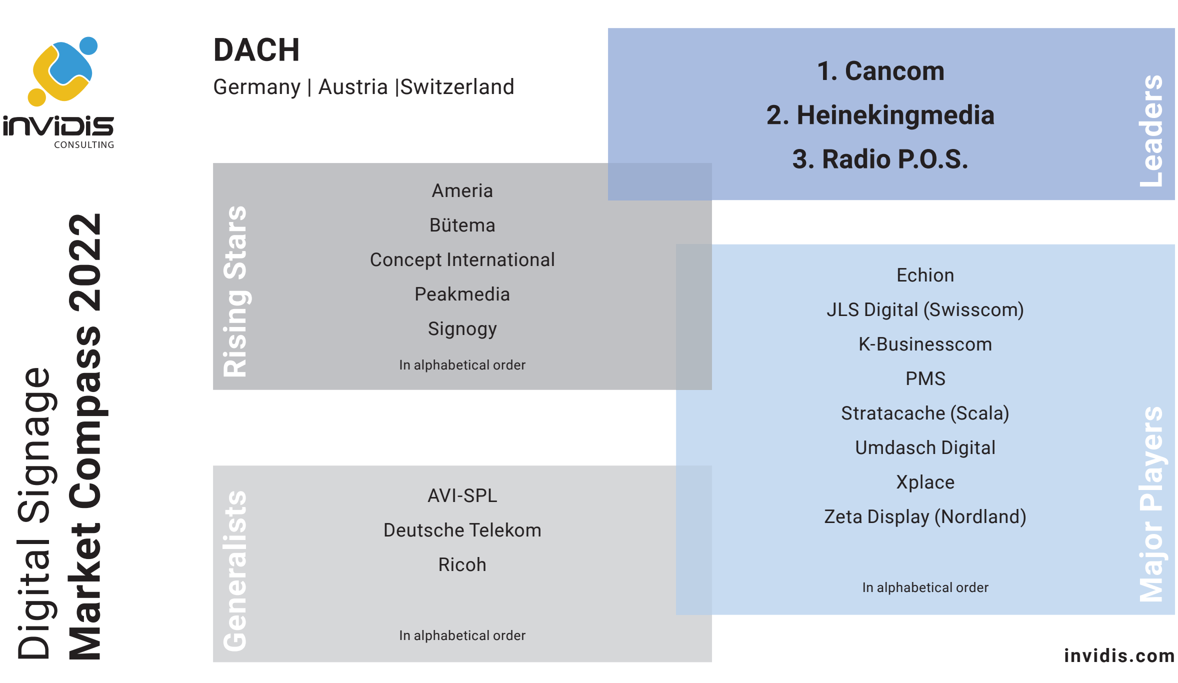
Europe's Top Market Takes Off

The DACH region can look back on 40 percent growth in the digital signage sector. The dominant integrators in all three countries are ready to meet the growing demand.

Florian Rotberg

Germany is Europe's largest economy, but the development of the digital signage market has been lagging behind others. But demand for digital signage solutions increased by 40 % in the aftermath of the pandemic in 2021. The DACH region is dominated by Cancom, Heinekingmedia and Radio P.O.S. Cancom is historically an IT-integrator, which acquired digital signage specialists, while Heinekingmedia benefitted as an education specialist from massive pandemic-driven digitalization in schools. For years, the privately-held Radio P.O.S. group operates very successfully in retail digital signage and instore radio projects, but mostly below the radar of the industry.

Market leader in Switzerland is JLS Digital (part of Swisscom) and in Austria K-Businesscom (formerly Kapsch). But the DACH region is generally characterized by hundreds of medium-sized and small digital signage solution providers and is much less consolidated. Umdasch Digital (part of Umdasch Shopfitting) and Xplace (owned by Me-



dia-Saturn electronics retail group) are dedicated digital retail specialists, providing digital signage as well as ESL-solutions. Also Echion, PMS and Nordland (Zeta Display) have a focus on digital retail projects.

The corporate digital signage market is dominated by ProAV- and increasingly IT-integrators with a strong hardware focus. No doubt trusted-names like AVI-SPL, Deutsche Telekom or Ricoh provide digital signage very successfully to blue chip clients.

Our rising stars are gesture tracking specialist (Ameria), Mobile ERP and DS expert Bütema as well as Concept (value-added distribution of media player and LED), full-service providers Peakmedia (Austria) and Signogy (Germany).

Photo: CANCOM

Cancom leads the Market Compass DACH.

DACH Top 20 DS Integrators 2022

COMPANY	COUNTRY	CATEGORY*	REVENUE 2021 (IN MIO. EURO)
Cancom	DE	TSI	30-50
Heinekingmedia Group	DE	TSI	30-50
Radio P.O.S.	DE	FSI	20-30
JLS Digital (Swisscom)	CH	FSI	20-30
Umdasch Digital	AT	FSI	20-30
Echion Corporate Communication	DE	FSI	10-20
Xplace	DE	TSI	10-20
Zeta Display (Nordland Systems)	DE	TSI	5,0-10
PMS Perfect Media Solution	DE	TSI	5,0-10
K-Businesscom (Kapsch)	DE	TSI	5,0-10
e-Kiosk	DE	TSI	5,0-10
Grassfish (Vertiseit)	DE	FSI	5,0-10
Tennagels	DE	TSI	5,0-10
Stratacache (Scala)	DE	TSI	5,0-10
Peakmedia	DE	FSI	5,0-10
4D Magic	DE	FSI	2,5-5,0
DMS	DE	FSI	2,5-5,0
Screenfood	DE	FSI	2,5-5,0
Trison Germany	DE	TSI	2,5-5,0
AVI-SPL	DE	TFI	2,5-5,0

* TSI: Technical Service Integrator; FSI: Full Solution Integrator; SW: Software (Developer)
Note: All figures are based on reports formcompanies or in estimates by an advisory board
Source: invidis consulting GmbH, company information

UK & IRELAND

Pent-up Demand

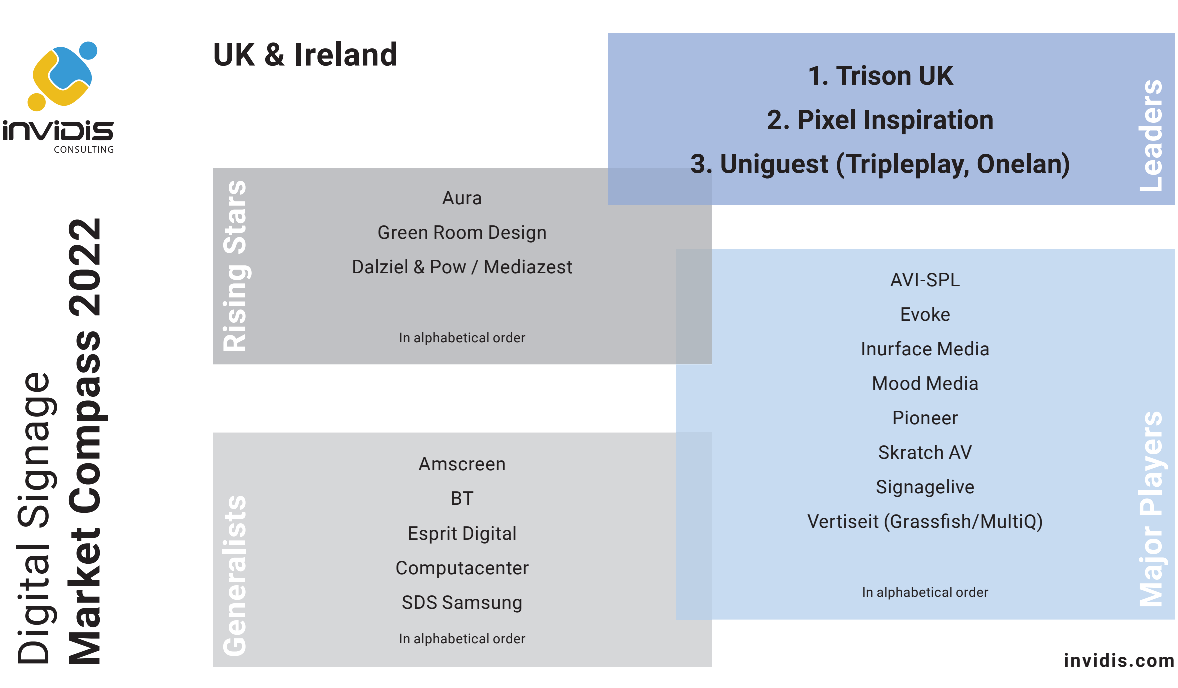
UK and Ireland is the second largest digital signage market in EMEA with a market share of 14 percent. In 2021, demand for digital signage solutions grew by 46 percent, mainly from retail and corporate.

Florian Rotberg

The British digital signage market is unique in many ways. London is home to many of the world's most respected retail architecture practices (e.g. Dalziel & Pow or Green Room Design), setting trends in physical and digital experiences across Europe and the Middle East.Demand for retail signage in the domestic market was lagging behind the rest of Europe in the past years, due to Brexit and more serious Covid effects than other markets. But recent invidis market research show a very robust growth in demand for retail and corporate digital signage solutions in 2022.

Leading digital signage solution providers are Trison UK (formerly Beaver), Pixel Inspiration and Uniguest (Tripleplay, Onelan). Additional relevant solution providers in the UK are Mood Media, Inurfacemedia, Pioneer and Skratch AV, but also UK operations of Swedish digital signage group Vertiseit. On the hardware side, Amscreen and Esprit Digital are globally successful manufacturers of digital signage totems mainly used by DooH media owners streetside as well as inside malls.

Ireland's digital signage market is highly influenced by the UK, as many trends and concepts are deployed on both sides of the Irish Sea. As the UK economy is 7,5x larger than Ireland (GDP 2020), the digital signage world focuses primarily on the UK.



ITALY

The Underperformer

The Italian digital signage market is trailing behind other European markets for more than a decade. With just 6 percent EMEA market share but a record 45 percent year-on-year growth in 2021 Italy holds great potential.

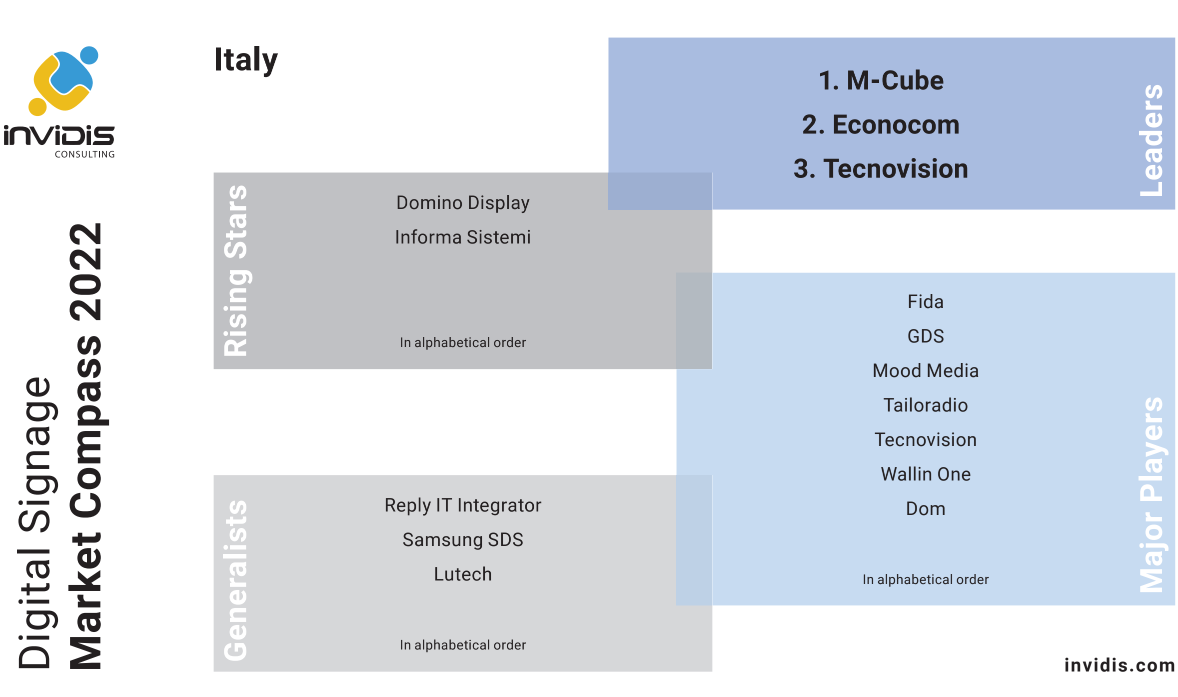
Florian Rotberg

No other market in Europe is dominated by a single digital signage integrator like Italy. M-Cube is by far the largest digital signage solution provider offering visual solutions including a dedicated LED subsidiary, instore-music and a digital experience platform. The Milan-based group counts more than 80 luxury brands as global customers. Distant second largest digital signage integrator in Italy is Econocom followed by Tecnovision. IT Integrators like Lutech, Reply IT and Samsung SDS are also relevant providers of digital signage solutions in Italy.

A very special digital signage pioneer in Italy is fashion brand Benetton, an early adopter of digital signage in flagship stores across the world. The retailer started with digital signage more than fifteen years, driven by the brands famous video art and social campaigns.

In general, digital signage is well established in luxury flagships in Milan and Rome and in stores of large national retailers like supermarkets.

GDS has become an expert for outdoor display solutions around the world, while Fida is a well-known expert for low-voltage retail display solutions. Two smaller digital signage integrators – Domino Display and Informa Sistemi – are companies to watch in the future.



NORDICS

The Next Phase

Scandinavia is not only the birthplace of modern digital signage – Scala (today part of Stratacache) was founded in Norway – but also first in consolidation. The Top3 integrators are active across Europe.

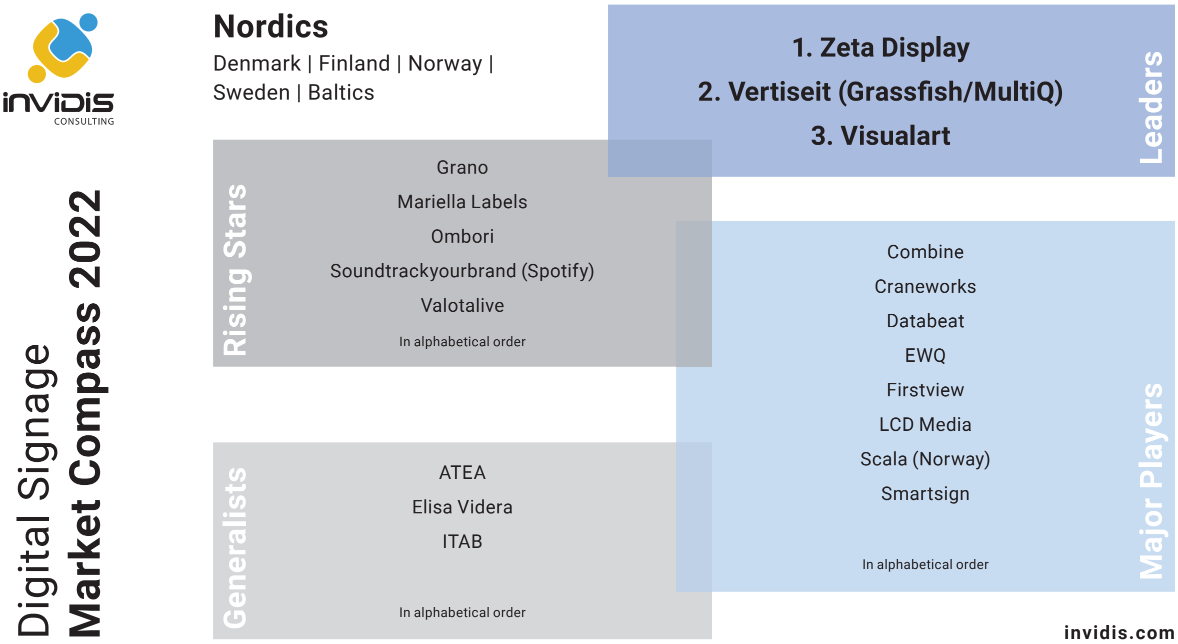
Florian Rotberg

Three large integrator groups emerged from the first consolidation phase in the Nordic Countries: Zeta Display, Vertiseit and Visualart. Today almost 20 formerly independent digital signage players are integrated into the three market leaders' organizations.

The second phase of consolidation is in the making and will increase the footprint of the three across Europe and even beyond. Zeta Display was acquired by Hanover Investors with the goal to buy & build an European champion. Vertiseit is following a similar growth plan as a public company, while Visualart plans to go public for international expansion.

The second row of Scandinavian integrators still operate primarily as national champions in their respective home markets and partly cross-border in neighboring countries. In contrast, software vendors and tech start-ups like Ombori, Smartsign or the B2B business of Spotify operate a highly scalable international business with clients around the globe.

As in most EMEA markets, IT, Telco and shopfitters are winning bigger digital signage projects as they already provide other services to clients and are trusted suppliers. They usually offer a large basket of IT-based solutions including signage or a trusted shopfitter for retail brands like ITAB.



SPAIN & PORTUGAL

Global Over Local

Post-pandemic recovery in the Spanish digital signage market is lagging behind the rest of Europe. That doesn't limit Spain's leading digital signage integrator to excel in international business.

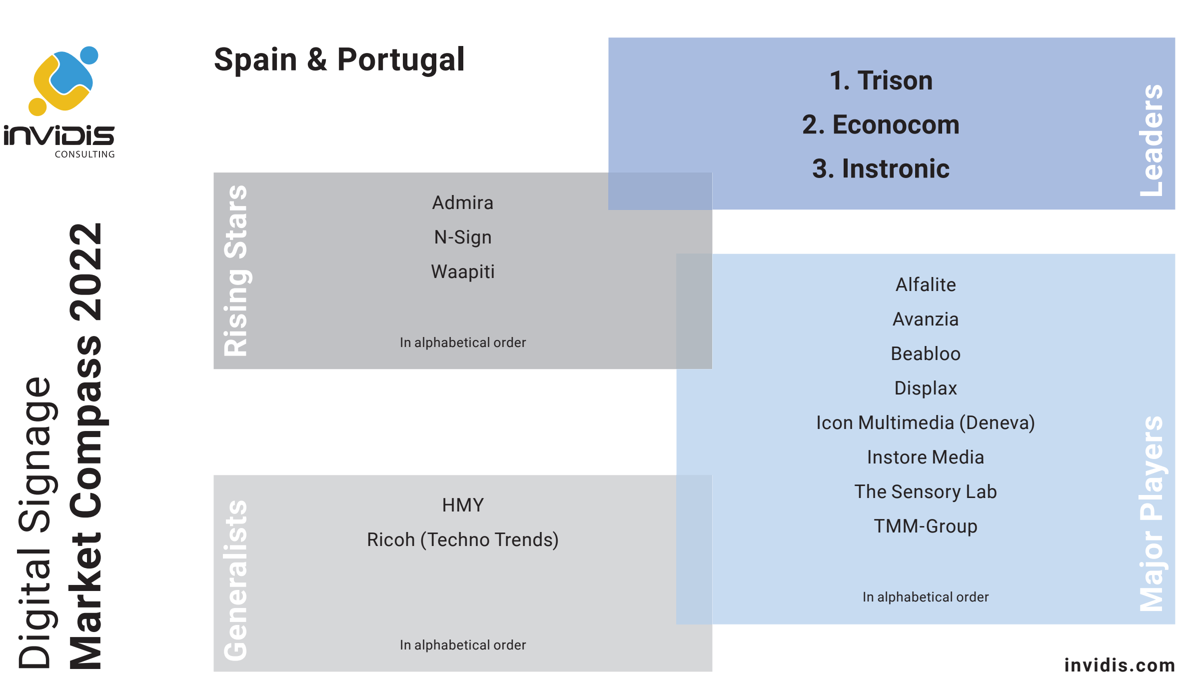
Florian Rotberg

While most European markets rebounded to 2019 levels, Spain is still struggling to reach pre-pandemic levels.

Trison, Econocom and Instronic are leading the Spanish digital signage integration market followed by digital signage solution providers like TMM Group and The Sensory Lab.

While the integrators dominate the still struggling domestic market, real growth is generated in Europe, the Middle East and especially in Latin America. The cultural and economic connection between Spain and Latin America is very close. Galicia-based Trison made the headlines in 2021 with a spectacular digital signage installation at Falabella's new Santiago de Chile flagship store. Especially Spanish CMS-vendors like Deneva, Waapiti or Nsign.tv are very successful in Latin America.

While many market players like to focus on prestigious international projects, Spain also offers some remarkable projects in the country itself. Barcelona-based Admira developed with IoT Gallery the world's smartest – and coolest – sneaker store, while Spanish LED-specialist Alfalite installed an immersive 360° LED room in Barcelona's Casa Batlló, inspired by its famous architect Antoni Gaudí.



FRANCE

In a Party Mood

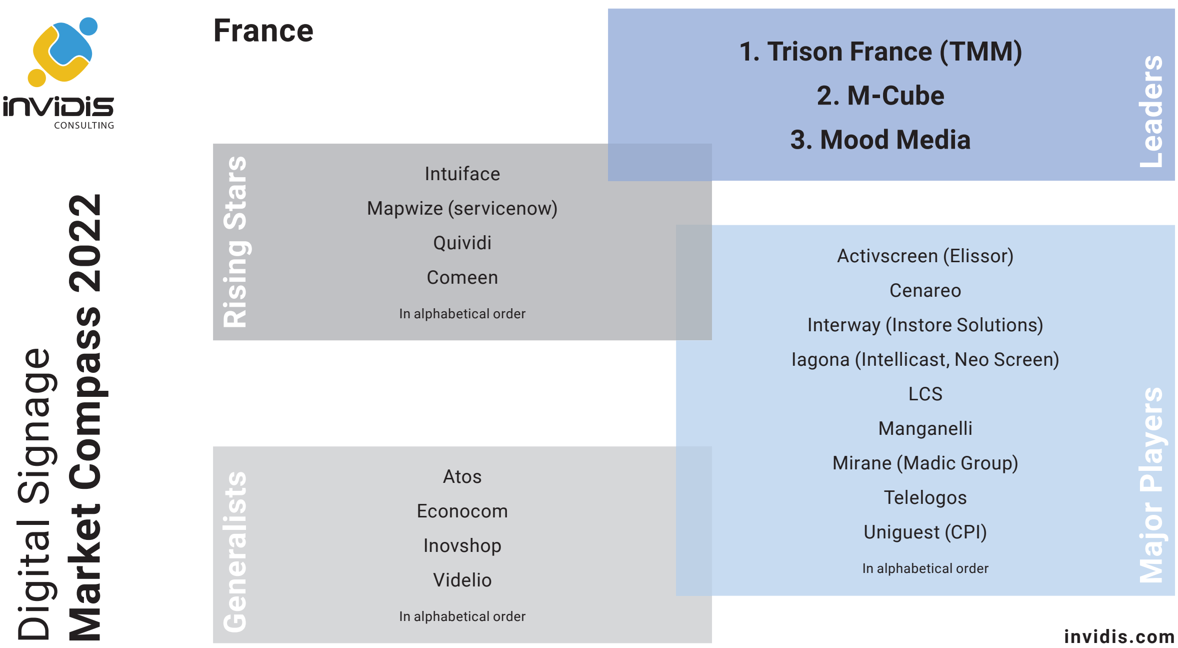
France is one of Europe's Top 4 markets, drawing a lot of attention from foreign digital signage solution providers. The three leading DS integrators are all part of an international group.

Florian Rotberg

In 2021, demand for digital signage solutions in France has grown by 41 % compared to the pandemic year 2020. The top three pure-play digital signage integrators are Trison, M-Cube and Mood Media - all part of a larger international group.

Due to multiple M&A transactions, most leading players have changed ownership in recent years, and more consolidation is expected. Main digital signage integrators like Manganelli, Mirane, Iagona, Interway and Uniguest have all played an active part in consolidating the French market in recent years. Beyond pure-play integrators, large IT-Groups, AV-Integrators and shopfitters like ATOS, Econocom, Inovshop and Videlio play an important role in today's French digital signage market.

France is also home to some very successful digital signage software developers like Telelogos (renowned specialist for shopfloor signage and device management), Intuiface (leader in interactivity) and some lesser known specialists like LCS (merged with NDS PADS) and Cenareo. One of the rising stars is digital signage workspace specialist Comeen. Quividi and more recently Navori (based across the border in Switzerland) are also leading the industry with analytics solutions while Mapwize (part of ServiceNow) offers indoor navigation solutions.



BENELUX

Moving Out Early

The Netherlands and Belgium are special markets in Europe. While relatively small in size, they over-exceed for years. The integrators in small markets expand faster into other countries.

Florian Rotberg

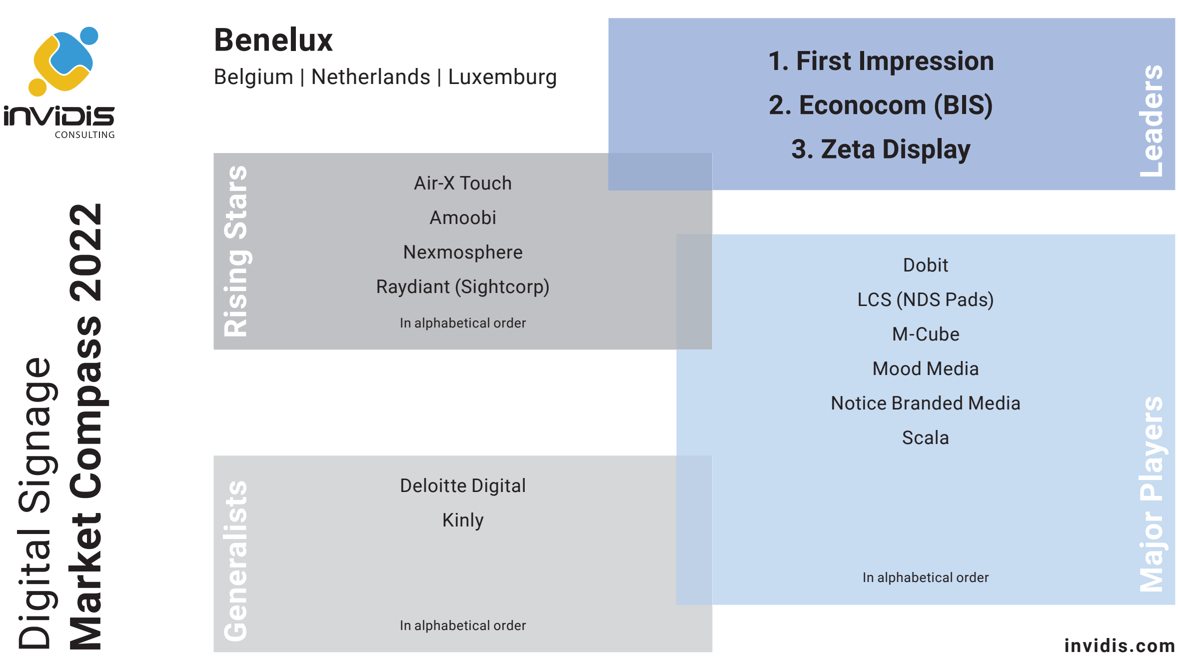
Similar to Scandinavia, the digital signage market in the Benelux region is much larger in comparison to the GDP. Solution providers with small home markets expand internationally much earlier than integrators in Germany or UK for example. First Impression is not only successful with large digital signage rollouts in Benelux, but also follows its customers across Europe.

Econocom (BIS) and Zeta Display are part of larger European digital signage groups and therefore benefit from international group business.

Other international subsidiaries successful in the Benelux market are M-Cube, Mood Media and Scala. Belgium based Dobit is considered as the most established digital signage retail specialist very well connected to regional retailers.

The region is also home to a group of international renowned innovative rising stars from different disciplines, like Nexmosphere (IoT sensors), Raydiant-subsidiary Sightcorp (Analytics), Amoobi (Retail Analytics) and Air-X Touch (gesture-tracking).

ProAV solution provider Kinly – originally from Scandinavia – operates out of the Netherlands a 250m Euro international ProAV business with an increased focus on digital signage.



TECHN

Read the story behind this picture on page 100.

OLOGY

Photo: Adrenorama

LED

More Diodes, Cheaper Production

Fine pixel pitch and chip on glass: direct-view LED displays are becoming more technologically advanced. But the global situation could slow down the technology's growth.

Florian Rotberg

The direct-view LED (DV LED) market remained an important driving force for the growth of the digital signage market in 2021. While manufacturers like to highlight their latest MicroLED solutions, the majority of DV LED still consists of SMD-based solutions. China – the region where almost all LED production is located – is still home to almost every second square meter of LED.

The leading fine pixel pitch LED manufacturers are all Chinese: Absen, Leyard, and Unilumin. Major foreign brands are Daktronics, LG, and Samsung. Even more so than the display market, the LED business is a typical project market, where market shares fluctuate from quarter to quarter.

While much of China remained in a state of stagnation, major Chinese brands turned their eyes from the domestic market abroad to secure sales. According to Omdia Research, Leyard increased its share in Latin America. Absen and Liantronics both increased their market share in North America. The market researchers also identified Samsung as the leader of the fine pixel pitch market outside China.

Since the start of the war between Russia and Ukraine, rising inflation, and the energy crisis, the demand for LED has already dropped significantly. It is expected that companies and government customers will freeze their construction budgets and that more expensive DV LED projects will be the first to be stopped.

While the ISE 2022 was dominated by the latest MicroLED solutions – Samsung presented the finest pixel pitch on the market at 0.63 millimeters – some future technologies could be found in more hidden corners. The world's largest display manufacturer BOE presented a first prototype of Chip on Glass (COG). With this new LED technology based on MicroLED, BOE expects to be able to produce much faster, cheaper, and with a finer pitch. Although the technology is not ready for mass production yet, industry analysts expect COG to shake up the market in two to three years.

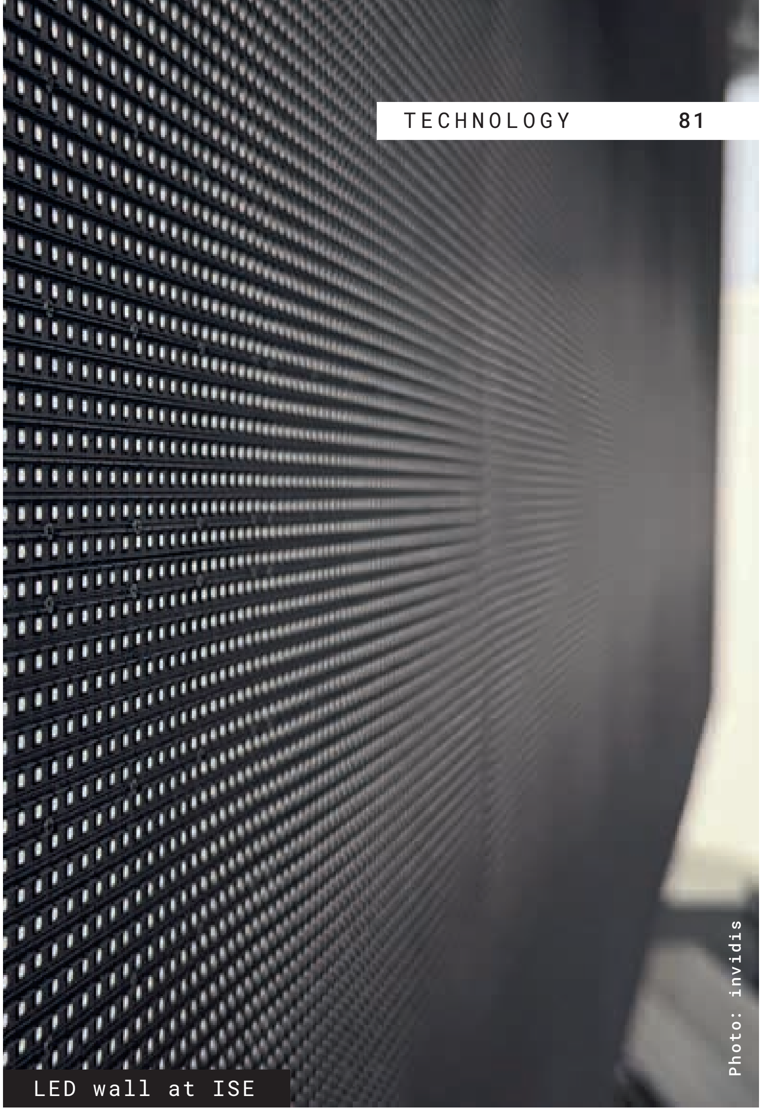
The LED industry has started to liberate itself from the standard 16:9 aspect ratio. Free-form digital screens have been praised as the future of digital signage. Most of the existing LED installations, however, generally stick to the established ratio, the main reason being the content that appears in 16:9. LED manufacturers are supporting this trend with an increasing number of easy-to-install all-in-one solutions. The AIOs bundle LED, mounts, video processing, media player, and cables – all components in one box and to be ordered with one SKU.

As LED enables the industry to realize virtual studios, immersive spaces, and command and control centers, larger integrators have begun sourcing their own SMD solutions in China.

Surprisingly, integrators such as M-Cube and Radio P.O.S. are selling significant quantities of LED to European customers. While SMD is a widely available white label solution, MicroLED is more complex and only sold by manufacturers.

The first integrator to develop its own MicroLEDs and invest in production equipment is U.S. company Stratacache. CEO Chris Riegel has acquired a decommissioned semiconductor plant in Oregon and is in the process of ramping up production for 2023. According to Chris Riegel, the investment required for a Mini/MicroLED is a fraction of a display factory and is "democratizing the visual solutions industry."

Stratacache plans to manufacture DV LED modules as well as backlight LED modules for smaller automotive displays. Some of the leading MicroLED manufacturers have also begun to set up production facilities close to large markets, for example in Eastern Europe.



LED wall at ISE

Photo: invidis

MicroLED von Samsung auf der ISE 2022

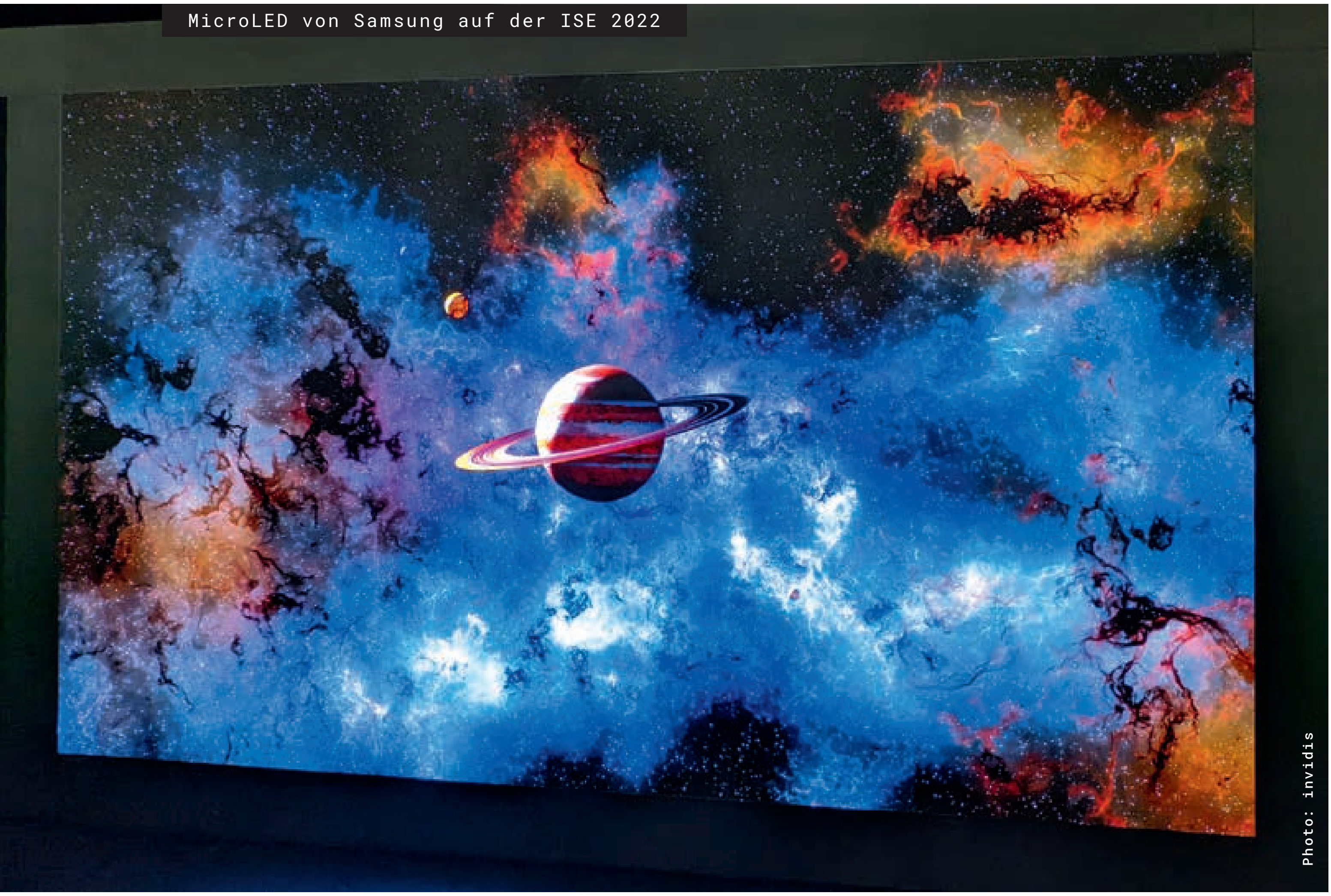


Photo: invidis

HARDWARE

A New Format Is on its Way

The new 21:9 displays offer 5K resolution and were explicitly designed for the requirements of Microsoft Teams Front Row.

Florian Rotberg

Jupiter LCD-Display Pana 105 in 21:9 ratio

Photo: invidis

In January 2022, Microsoft announced the launch of Teams Front Row, a new feature for hybrid video conferencing. The application is designed to be used in a 21:9 format and is supposed to facilitate eye level interaction in hybrid meetings. It aims at integrating all participants in a meeting with ease and without distraction – both those in the meeting room and those participating virtually.

Front Row moves the video gallery to the bottom of the screen and shows virtual attendees at eye level with the people in the meeting room for a more natural face-to-face interaction, as if everyone were in the same room. Meeting chat and participants with raised hands are brought to the forefront, so that everyone sees the conversation and can actively participate.

Front Row is available for all team rooms on Windows, in single and dual display mode, and for all screen sizes. To ensure optimal viewing, Microsoft recommends a resolution of at least 1,080 pixels – for either two single or dual displays. The ideal solution for Teams Front Row would be a single screen with a 21:9 ratio and 5K resolution, the company says.

For LCD and LED

Hardware manufacturers are now following this recommendation. One of the first suppliers to offer the format is Jupiter with the LCD Pana 105, available both as passive display and touch display. At the ISE, Sharp/NEC already presented a 21:9 Front Row LED. In Las Vegas, 21:9 LCDs were seen at the booths of several specialized suppliers.

The big advantage is that a wider format can display chat and other functions side-by-side, next to the participants' faces. To avoid any distractions, Microsoft Teams Front Row hides the notebook video stream of people who both physically present and participate via their notebooks.

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PROJECTION

Renaissance of a Technology

Digital signage projection experienced technical improvements and a broadened application range. Especially in short-term projects, there are some upsides in comparison to LED. But there is also new potential in the retail sector.

Dave Haynes

Technology advances have lowered or removed many of the barriers and opened up the possibilities for projection systems in digital signage projects – whether they are used for giant, façade-filling canvases or tiny animated sprites beamed on retail product displays.

Among the advances:

- Lasers have replaced lamps, greatly extending operating lives and lowering maintenance needs;
- Projectors bright enough to deliver sharp, rich visuals are now much more affordable, and manufacturers can push many more lumens (brightness) from much smaller systems;
- And steadily smarter, more automated software has dramatically lowered the complexities of mapping, stacking and edge-bending projection jobs. That has helped simplify tasks that previously needed specialized applications, and democratized work that used to require a lot of deep expertise, time, and money.

Projection is now a much more viable, valid option for digital signage projects, and in some cases, it is the most suitable option because of some of projection's unique, mixed reality capabilities – like being able to supplement a physical display by beaming digital visuals on or near it. Think about an apparel or footwear brand that wants to highlight and explain the key attributes of an item, or the overall brand. The conventional approach might be a rectangular screen fixed above, besides, or maybe even behind the product display. That screen can be built in and somewhat integrated, but it is still just a screen at a merchandising position.

With projection, that "conventional" product display can have digital elements that appear beside and around a product, like call-out messages or pop-up videos, and disappear again. Vines can seem to grow out of a shoe. Dust and debris can disappear into a stick vacuum head.

Using projection, the product can be the display canvas – the visuals precisely mapped to show only on the item – whether that's a mannequin, home appliances or furniture.

"You can create a larger-than-life experience projecting on a building to bring some historical value, or context to something," says Remi Del Mar, projector manufacturer Epson's digital signage subject matter expert, and product evangelist. "No other technology can do that, or on a smaller scale conform to a 2D and 3D object in the same way."

Projection can be used in places where other display technologies are ill-suited, notably on floors. It is particularly well suited for short-term projects because a lot of the traditional infrastructure needed for big visuals – like the mount-

A major asset of projectors is their ability to turn historic buildings into a canvas.

Photo: invidis

ing hardware, cabling, and physical displays, are mostly unnecessary.

Using projection also minimizes one of the key challenges presented by LED video walls – the tangible risk of damage. Conventional direct view LED video wall technology is inherently fragile because the tiny light emitters that deliver the visuals are easily damaged or knocked off, particularly in busy environments like retail and mass transport.

With projection, the display canvas is just the target surface. There are no electronics at risk, as the projector systems are (usually) suspended up above, out of the way, and if accessible, are easily protected.

Manufacturers Seeing Opportunity

A Dallas, TX digital signage solutions company – Glass Media – has focused on projection since launching in 2015, and watched as a very different landscape for the technology has evolved, and as costs have dropped. “Things are finally starting to happen, it's taken a while,” says founder Daniel Black, noting how manufacturers are now paying attention to what companies like his need in terms of features and capabilities.

R&D and adaptation have also helped. Permanent projection jobs for deployments like advertising and retail marketing used to be rare, because the systems used lamps as lighting sources, which only lasted 1,500-2,000 hours before needing to be replaced. New bulbs were expensive, but so were the costs of technicians and equipment to make the change. Now, laser-driven projectors have 20,000-hour operating lives, or more in eco modes, meaning they can run for several years. Projectors that use LEDs as the lighting source have even longer operating lives, but do not have the brightness levels needed for many commercial jobs.

To win the visual battle with ambient light – from windows or just the built environment’s normal lighting – particularly bright projectors are needed. Lamp-based projectors were not only expensive, but also tended to be very large – the size of suitcases you might use for extended vacations. Lasers and other advances have greatly reduced the form factor, making them easier for both designers and building engineers – who have to worry about things like weight – to work into spaces like stores, corporate spaces, and museums.

It is also helping, says Black, that manufacturers are standardizing on single chassis designs and smaller overall sizes where they can, making it possible for solutions providers to use different lenses for the same units.

"We like to think in terms of modularity", Black explains. "If we can specify a single projector, regardless of the type of environment, how close it's going to be relative to the window, how high it's going to be on the ceiling: That gives us a lot of creative freedom, because we can more easily specify the hardware to use."

Expanding applications

While numerous display technology companies develop and market projection systems, most have focused on hardware tuned to workplace meeting spaces, or specialty applications like cinema. Japan-based Epson, however, has developed products specific to digital signage applications like retail.

Like Black, Del Mar also sees a shift in mindset about designing and operating built environments, reducing the fixation on RoI and instead looking at variables like the return on experience, or return on engagement.
Epson attracted a lot of attention for its Lightscene projectors, which adopt the appearance and functionality of ceiling mounted track lighting systems – except the lighting cones push full-motion visuals to areas on nearby walls.

The specialty projectors are more easily blended into designed spaces – looking like lighting and not electronics suspended from ceilings. But their size and design also present limitations in performance, such as brightness, which make them most suitable in environments like the home furnishing galleries in Ikea stores.

Diversified use-cases

Across a spectrum of sizes and shapes, from larger cinema-grade systems to "pico" projectors not much larger than smartphones, projection is now being used in a variety of ways:

- Large format for outdoor: Super-bright projectors, usually in arrays of multiple blended systems, illuminate the full facades of buildings and monuments;

- Large format for indoor: The same projection-mapping technology used for outdoor environments is being used for permanent multi-sensory, experience-driven attractions, like Montreal's Oasis Immersion or Atlanta's

Projection Systems can turn large areas into immersive rooms.

Photo: invidis

Illuminarium. There are also numerous touring exhibitions, such as those projecting giant renditions of painting's masters;

- Surface projections: The moments before sporting competitions are increasingly turning into multimedia spectacles, with the playing surfaces – from ice hockey rinks to the 100M track at the Tokyo Olympics – lit up with large format video. Overhead floor projections are also being used in shopping malls and retail to offer everything from directions and promotions to interactive-games paired with camera-based sensors. In Brazil, dynamic floor projections are being used by an airline to guide and speed the boarding process at airport gates;

- Experiential: Full-time restaurants and high-end banquet facilities are using projection mapping to fill the surrounding walls with themed visuals (like forests and beaches), but also directs custom motion graphics down on the dining tables and plates;

- Retail Marketing: Along with using projection systems to augment fixed product displays and other surfaces, projection systems paired with specialty films are turning windows and custom-cut glass into multimedia surfaces. Sharp/NEC markets a solution that works with switchable glass, that can be clear or revert to an opaque state that accepts projections. Glass Media is custom manufacturing fixtures that embed projectors in tabletops and enable small-format projection mapping on small items like watches and jewelry.

- Corporate: Projection systems have been standard in workplace environments for decades, but instead of units parked on meeting room tables or suspended above them, tech-forward companies are using multiple projectors to convert the walls of meeting spaces into projected canvases – using sensors to enable interactivity.

Near-Future Applications

The projection renaissance enabled a broad application range to compete again with other visual technologies. One of the next steps, that Black sees, could be projection mapping on 3D objects.

Photo: Glass Media

Glass Media works with projections on glass.

Projection could be used on objects like mannequins in retail applications. But this poses different challenges. For example, if the retailer changes the jacket of the mannequin, the integrator can't recalibrate that visual from the cloud; a technician has to it physically. And if a shopper accidentally bumps the mannequin, and moves it an inch to the right, the image mapping is off.

To solve this, Glass Media is going to build its own computer vision platform, where software can handle adjustments like that remotely, in the cloud.

So the possibilities are there, now it is about raising awareness for them. Remi Del Mar, for example, invests a lot time convincing industry people that the variables have changed.

A lot of them think from experiences 10 years ago of projection as a technology that is expensive and doesn't work. "I get all those objections," she says, "and I've got to do the work to remove those objections and just get them understanding: No, no, guys, it's different now."

Projection is back in the game, and ready for a new era.

SOC DISPLAYS

The Performance Evolution

Is System on Chip as bad as its reputation? No, according to an independent study by SignageOS and invidis. Especially not when it comes to standard applications.

Florian Rotberg & Stefan Schieker

Since the inception of SoC ten years ago, discussions about system-on-chip displays come with a lot of passion and mixed opinions about its performance. An established industry understanding is that external players are the only way forward for a proper digital signage application, while SoCs are of inferior performance. Only capable of playing standard content for digital posters or other simple use cases.

System on Chip is a computing unit with CPU, GPU, storage, and operating system integrated on a single chip. This technology emerged along with mobile devices, such as smartphones, and is used even for the most advanced devices such as Apple MacBooks. In digital signage, the SoC is embedded within the display – or some external players – and is often used to power not only the content playback but the display as a whole.

The first generations (2013-2015) of SoC justified the negative image. A play-out of two videos and an image without a gap was impossible. Similarly impossible was a play-out in portrait mode. Early generations struggled even with basic digital signage use cases and quickly gained a really bad, but deserved reputation.

The negative image has stuck with SoC until today, despite enormous hardware performance gains and improvements on the software side. Ten years later it is time to reset the clock by benchmarking SoCs with external media players. invidis teamed up with SignageOS to independently test how SoC performance has evolved from 2013 to 2022.

Hardware Specs vs. Reality

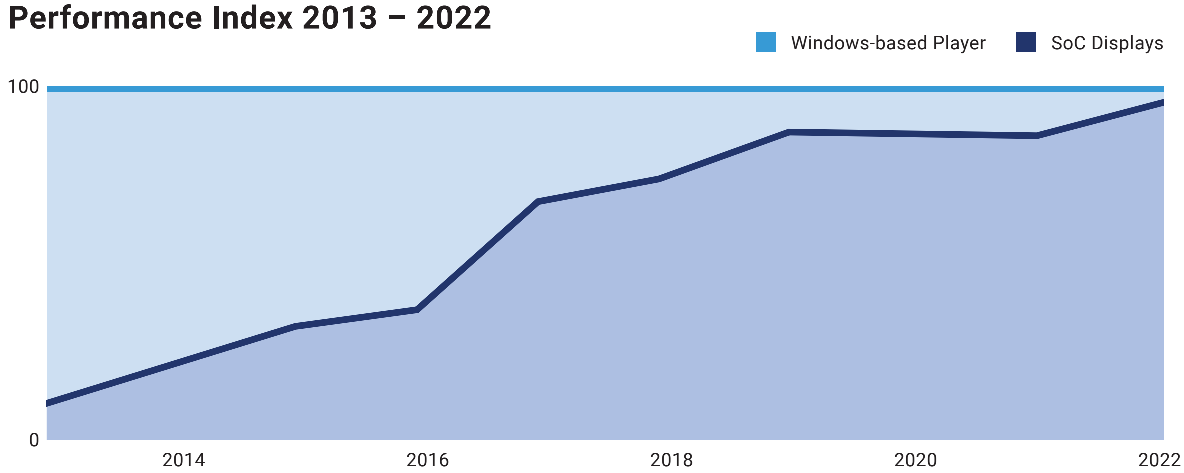
Comparing any SoC with any external player, in most cases external players will provide superior hardware specs and thus better raw performance. But is high performance necessary for mainstream digital signage use cases that invidis classifies as Gen 2 *(see also page 90)*? Not really, as long as the system provides quality content playback.

Today's SoC performance is fully sufficient to play-out content in a way that is pleasing to the eye, without gaps and with fast and seamless transitions between each content. In 2022, Gen 2 signage use-cases make up more than 70 % of installed base, for the vast majority of use-cases it does not matter whether the content is served from an external player with an abundance of performance or from the embedded SoC in the display with just enough performance to get it right.

SoC's capability of covering different mainstream digital signage use cases and evaluation of the content playback quality are great metrics. Using it, one can easily compare performance evolution over time and benchmark against industry-standard external media players.

Mainstream digital signage use cases are digital signage applications found across different ver-

Windows-based Player and SoC Displays Performance Index 2013 – 2022



The performance index of SignageOS shows: The performance of SoC displays comes close to that of media players over the years. Source: SignageOS

ticals such as QSR menu boards, retail in-store communication, banking, transportation, hospitality et cetera. Outside of mainstream digital signage are invidis Gen 3 and Gen 4 applications like touch-interactive experiences, sensor-connected applications, 3D wayfinding or LED video wall deployments.

SoC Displays are Closing the Gap

Determining the development of SoC-performance over the past ten years was based on benchmarking all major SoC displays released to the market since 2013. The Prague-based SignageOS lab tested more than 100 SoC-Displays from all major brands across the ten year timeframe. The best-performing SoC of each year was chosen for the comparison. Benchmark (index 100) is a standard Windows i5 external media player – the de facto standard in digital signage – which passed all tests.

While the early versions of SoCs were not very competitive compared to market expectations, covering only the minimum of the mainstream digital signage use cases, later generations have caught up. The latest SoC generations are on par with Windows i5 players (Win 10 Pro, Intel Core i5, 4GB of RAM) for mainstream digital signage use-cases (invidis Gen 2).

SoC displays in 2022 can play multiple videos, render complex HTML5 content with transitions and overlay videos, and deliver advanced animations. it can also be extended with sensors and other peripherals.

Conclusions

SoC has come a long way and is here to stay. Not only in current times of supply chain bottlenecks, which are more severe on the CPU (Intel) side than on the availability of smart displays. The challenges in the early years were a mix of lacking hardware performance as well as a lack of expertise on the software developer's side. SoC displays have significantly evolved since 2013 and have almost fully closed the gap to the de facto standard Windows i5 platform.

Performance Testing Methodology

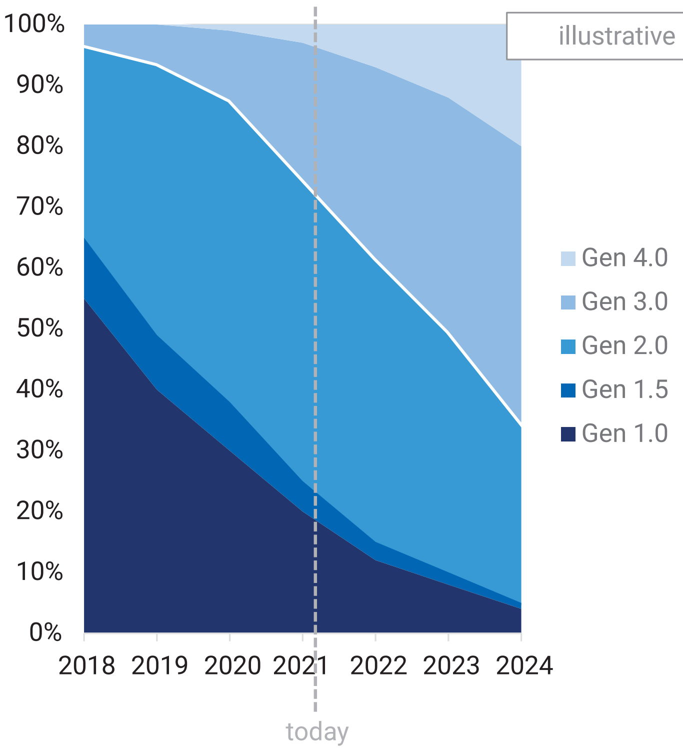
SignageOS Performance Benchmark Methodology consists of 30 to 47 unique content test cases, depending on the tested HW specs, mirroring the use cases in the mainstream digital signage. Tests are divided into 11 groups with defined validation and acceptance criteria. Each test is performed on a physical device, evaluated, and recorded on a high-res camera. The evaluated device receives the final score expressed as a percentage of passed tests against the total number of tests performed.

SoC-optimized software and remote device capabilities offer digital signage network owners a highly resilient, energy-efficient, and remotely manageable solution with fewer points of failure and a low TCO. We expect SoC to become the dominant solution for mainstream digital signage in the upcoming years.

While the best performing SoC displays are very close to delivering the same or better experience as some external players, there is also an increasing discrepancy in SoC quality among different display manufacturers. Not every SoC display can deliver the same level of performance, and

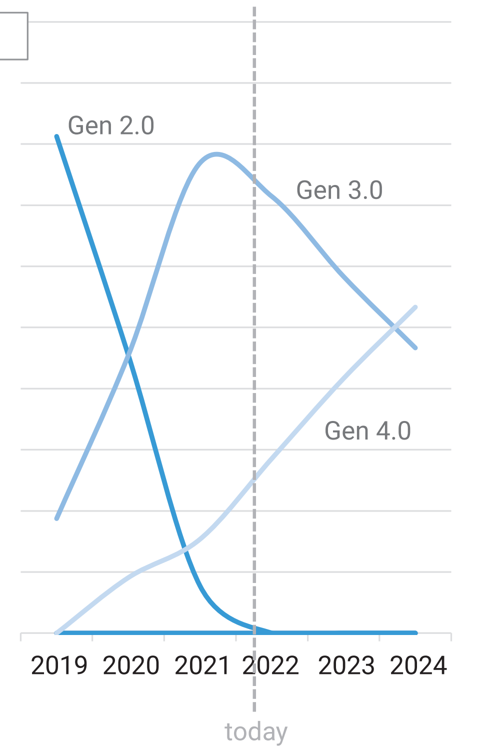
DS Installed Base by Generation

Western Europe, in % of Installed Units, Year End



DS Net New Installations by Generation

Western Europe, % of Net New Installations, YoY Change



Invidis identifies different digital signage application generations:

- Generation 1 and 2 installations ("hang-and-bang", "touch", and "local experiences") represent still the about 2/3 of installed systems
- Most of the new projects are Generation 3 ("connected signage"), many replacing older Generation 1 and 2 installations
- Generation 4 ("business critical") projects are quickly gaining traction
- By end of 2024 we expect about 2/3 of the installed base to be Generation 3 or 4

there are still SoC displays that underperform the market expectations.

Therefore, SoC will not replace external media players completely. There are still plenty of use cases that require special features that are not provided by SoCs. And these cases will rather increase than decrease with Gen 3 (Connected Signage) and Gen 4 (Business Critical) digital signage solutions.

SoCs need the proper expertise

As an embedded system, SoCs are highly optimized and specialized computing units. Compared to general purposed Intel-based players, they require more knowledge and expertise when building solutions leveraging this type of technology. Without these skills, it is very difficult to harness all the performance the SoCs are offering. However, if you possess these skills, today's SoCs have more than enough performance to accommodate any mainstream digital signage use case.

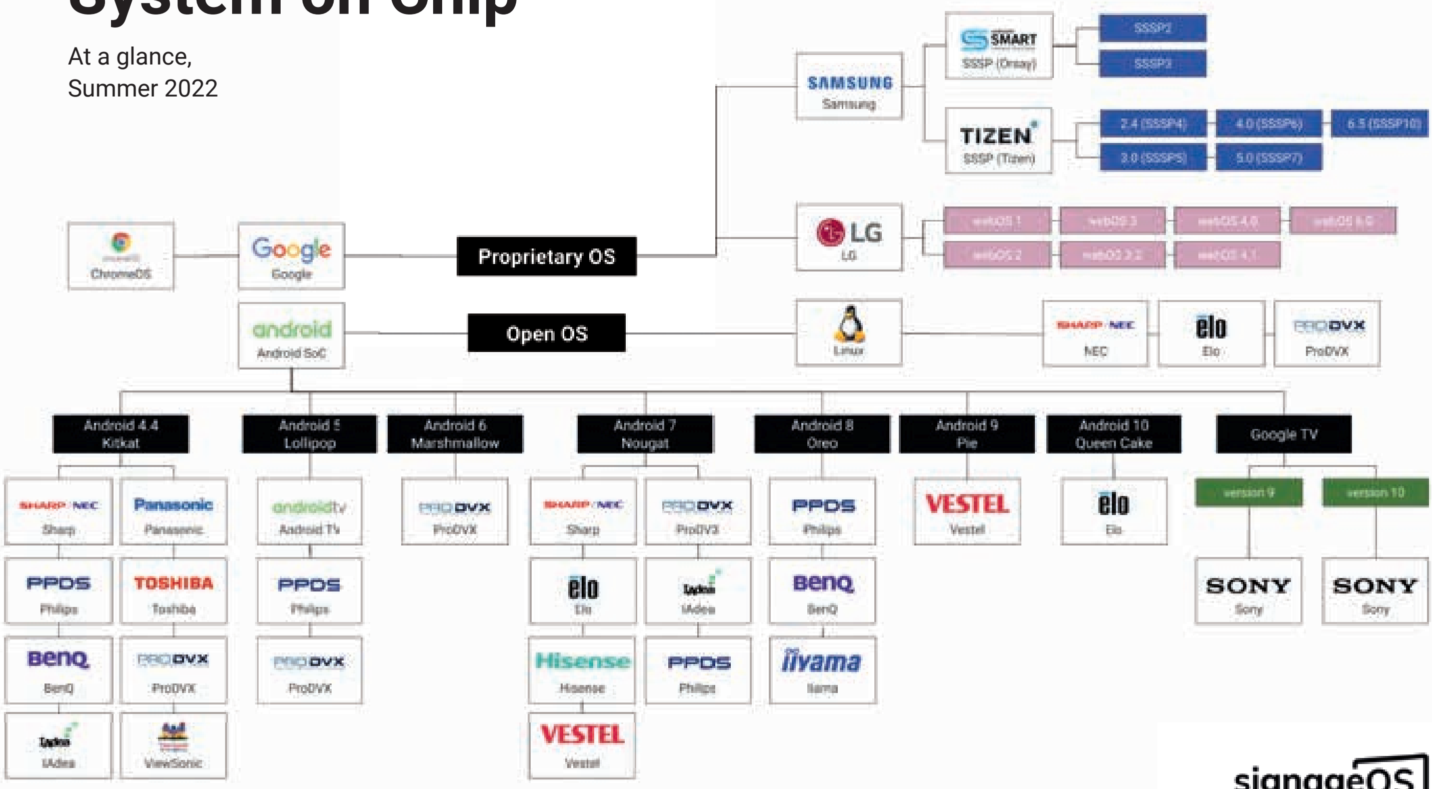
About SignageOS Research Center

The SignageOS Research Center provides industry members with a single location to learn and analyze digital signage hardware across a variety of key performance indicators such as content playback quality, device management, and security. SignageOS completes extensive testing as a core component of development and operations.

SignageOS Research Center is designed to publicly present these findings to assist in informed decision-making for every digital signage use case. The SignageOS Research Center's goal is to not only act as an essential resource for digital signage hardware analysis but to drive innovation through cooperation with hardware manufacturers and other members of the digital signage industry.

System on Chip

At a glance,
Summer 2022



Source: SignageOS

MEDIA PLAYERS

Power on the Edge

Despite the increasing performance of SoC, there are still many good reasons for using media players. Performance and operational reasons play a role.

Stefan Schieker

As outlined in the previous article, SoC systems have gained enormously in performance over the past few years. Standard applications can now be implemented with System-on-Chip without any problems. Does this automatically mean the end of the traditional media player? If you look at the standard applications mentioned, you have to say: Yes. There is no reason for the additional costs and another potential source of failure.

However, there are installations that still require the performance of a media player. These include interactive or touch applications, for example, as well as installations that involve IoT sensors and analytics applications. The computing power of external devices is also needed for LEDs, and in partially for video walls.

In some cases, special customer requirements that are not natively supported by the utilized software platform require the execution of additional applications. Therefore, the performance of the software platform also impacts whether SoC or a media player is chosen.

In contrast to the highly standardized SoCs, it is possible with external media players to fully customize them to the respective use case in terms of interfaces, network connectivity, performance, and hard disk storage.

Beyond performance factors, integrators often have operational reasons for using media players:

- Software compatibility: SoCs typically have their own operating system, and not all software platforms support all SoC operating systems.
- Support: Uniform networks are easier to manage and support.
- Service: Particularly for displays that are built into furniture or are difficult to access, an external player can be positioned for easier service access.
- Personnel: For large displays, on-site SoC replacement requires two technicians, while player service/replacement can be performed
- Extended warranties: For displays, these are typically a maximum of 5 years. Warranties for players can be extended beyond that

SoC performance will still increase. At the same time, with the growth of DSXPs and business critical installations, complexity and performance requirements will increase exponentially. New, hybrid network architectures, for example, with a high-performance network hub and multiple linked SoC displays, could be one solution. However, this will also require new approaches to digital signage software.

So, we will still see a coexistence of SoC and media players.

The Google stand at the ISE already stirred curiosity in the DS industry.

PLATFORMS

Google's Second Attempt

After the first attempt in 2015, in 2022 Google wants to re-enter the digital signage industry with Chrome OS Flex and win over the market, advertising its flexibility and data security.

Balthasar Mayer & Stefan Schieker

With a first early access release, Google announced a renewed version of Chrome OS: Chrome OS Flex is a cloud-first operating system for Windows PCs and Macs and is supposed to be fully compatible with Google Cloud Management. Primarily planned for the use in corporations and schools, the free-of-charge system is based on Cloudready, a platform from the developer Neverware which Google acquired in 2020.

The new OS also makes it possible to run Chrome OS on non-Chrome OS proprietary devices. According to Google, the advantages are not only intuitive usability, but also regular system updates running in sync with those of Chrome OS, so that all devices in a network are on the same level. The special feature: Chrome OS Flex is also supposed to be suitable for special hardware such as e-kiosks and digital signage displays, which are designed to run via a cloud-first system.

After 2015, this is Google's second attempt to break into the digital signage segment with Chrome OS. The first attempt in 2015 was not granted with success, even though many well-known media player providers like HP, Asus, Acer, Aopen, and Dell supported the platform. CMS providers, in contrast, did not follow suit. Instead of Chrome OS, they focused on Google's Android mobile and SoC system.

Potential and Trade-Off

From the perspective of industry insiders, Google's second market entry in 2022 could turn out more successful: Simplification and unification offer great potential. Chrome OS Flex makes the lives of system integrators easier because it allows them to fully focus on the DS applications without concerning themselves with the operating system, its monitoring, and updating.

Unlike in the past, the new version does not run exclusively on certified hardware. This allows for flexibility, and for existing, older hardware to be used longer – in line with the trend toward sustainability.

The name Google always stirs skepticism when it comes to data collection. However, unlike Google's B2C business model, Chrome OS Flex is based on a licensing model. And with that, Google promises its customers full data sovereignty and security in the B2B sector.

GOOGLE CHROME OS

Away from the Workstation

Reliable, scalable environment with potential: How Google's developments in the digital signage sector can help to break away from systems that specialize in other areas.

Guest Article by Peter Critchley

We've been in the business of delivering digital experiences for almost 25 years, and in that time the industry has changed dramatically. When we started out in 1998, the PC was just about capable of driving moderately complex 'multimedia' computer TV channels, and 'large format display' meant a bulky and heavy widescreen TV using cathode ray tubes. Plasma screens were just starting to appear, and we were a long, long way from cloud computing, let alone fast and reliable internet connections.

Through the following decade, things moved swiftly on, although '"enterprise-grade digital signage" generally meant on-premise solutions, with servers and the associated complexities of corporate networks, server rooms and IT infrastructure. Web-based platforms were starting to develop into the space, and the capabilities of browsers and the associated technology was coming along, but the space was still dominated by a number of long-standing players, with closed eco-systems and pricing models to match.

In September, 2008, Google launched the Chrome browser and, from a standing start, it was the dominant browser by June 2012. The Chrome browser was unique as a cloud-first platform, and also because it featured Chromium OS, launched in 2009 as an open-source project which aimed to provide a fast, simple, and more secure computing experience.

This enabled early adopters in the industry to orientate completely around a cloud-based, web technology centric model for the delivery of content experiences, and in 2011, Google launched its own formally managed OS, Chrome OS.

Virus-free since Eleven Years

Chrome OS was conceived as a fully curated software and hardware platform, with a single release profile and security baked in from the start with carefully validated hardware devices from the leading global technology providers delivering a Google-verified hardware platform for all manufacturers.

Today, this provides users with a completely reliable, cloud-based, highly secure and efficient technology stack for education, enterprise and personal use. Since its launch 11 years ago, there have been zero reported cases of viruses or ransomware on any Chrome OS device. Chrome OS also features a "verified boot" process which compares various elements of the OS data structure on boot-up with a second copy, ensuring that no files have been compromised.

This is all complemented with an online management console, which fully manages apps, users, security, and a myriad of other settings to provide a completely managed structure for devices, user experience and secure data usage.

The Chrome OS environment delivers a seamless, efficient and comprehensive management suite. When used in conjunction with Google Workspace, it combines to provide seamless SSO, administration and app management controls which are embedded into the very fabric of the approach Google has taken with the OS.

Devices can be enrolled en masse, apps can be pre-configured, organizational structures can be defined with completely independent rules and settings, devices can be fully remotely managed, and administrators have complete control over all aspects of the operation of networks of 1,000's of devices.

The Dominant Use Case

But, back to digital signage, and the early 2010's: It is fair to say that PC's, and Windows, dominated the space and countless screen networks were deployed – and countless screen networks experienced the dreaded BSOD, Windows Update requests on-screen or numerous other 'Workstation' experiences which impacted the display of messages, due to the dominance of the workstation use-case for computing which dictated how digital signage could be deployed.

Options like Android-driven networks were explored, and custom environments were built by companies in the space using Linux as a backbone, but they remained comparatively small operators in relation to the primary OS platforms in the space.

In 2015, Google launched a 'kiosk' version of the Chrome OS, which enabled network owners and integrators like Trison to deploy Chrome hardware devices within their enterprise running just a single app, and never booting into an 'explorer' experience, or similar. This completely changed the landscape of how reliable, scalable, and secure devices could be deployed, at low cost, within an enterprise environment. There was no ability to ever 'break-in' to the platform, nor compromise the experience displayed on screen.

Since 2015, Google has worked with numerous hardware and software partners, like Trison, to build ever-more customized functionality into Chrome OS, specifically to support the digital signage use-case.

Multi-output and commercial-grade hardware options have also been built by Acer, Aopen, Asus and others, and these robust hardware platforms deliver consistent playback in challenging environments over many years.

We now have 1,000's of Chrome OS devices running across corporate, hospitality, retail, government, and numerous other sectors. We do have a small legacy network of PCs running Windows, and this enables us to observe the significant delta in the number of support instances which are caused by Windows devices when compared to Chrome OS devices.

Chrome OS doesn't do it all, yet. We still need to use Windows for 6-output devices, or similar edge use-cases, but the recently launched Chrome OS Flex is now delivering a significant ability to enable these PC devices to run a fully verified Chrome OS environment, and migrate completely away from Windows. By installing Chrome OS Flex onto older PC or Mac devices, we are also able to extend the life of older networks significantly, and remove the additional overheads associated with Windows into the bargain.

The announcement of the Chrome Enterprise Recommended Track for kiosk and digital signage signals the importance of our industry to Google, and recognizes the significant work which all the founding members of this program have delivered to make Chrome OS a real and growing solution for the delivery of digital experiences.

About the Writer

Peter Critchley has worked in the digital experience industry for 27 years and since founding what is now Trison UK (formally Beaver Group) in 1998, it has been organically and steadily developed into a carefully selected team of creative and technical specialists.


Photo: private

Peter Critchley

SOFTWARE

Time for a New Architecture

Cloud-based, extensive remote device management capabilities, IT security certifications and API first: Digital signage software must adapt to the requirements of digital signage experience platforms (DSXP) to remain future-proof.

Stefan Schieker & Florian Rotberg

The progress of digital signage technology is often measured by visible components: displays, video walls and LED. While there were no revolutionary innovations to be seen in visual solutions last year, the real revolution is taking place behind the scenes, in the software. The tectonic shifts in software architecture are taking place under the surface, but they will change the entire digital signage world permanently.

The road leads from a "one-trick pony" digital signage silo application (DS) to a fully integrated digital signage experience platform (DSXP). Next Gen software platforms are fully connected, scalable and highly automated solutions. The new requirements bring extensive consequences for the structure of the software – Next Gen digital signage applications need to provide much more than a simple DS CMS and playout software.

This poses a challenge for most independent software vendors (ISV): many of the established software platforms derive from the world of traditional digital signage, with playlists and one-off on-premise licenses. A legacy setup will no longer fit the requirements of DSXP – and thus lose touch with modern DS developments.

Three routes to success

The big question that ISVs now have to ask themselves is: How do you move from the traditional DS world to the DSXP world? In general, there are three possible routes.

The first option is to stay in the traditional DS world and stick with your original business model. The ISV avoids possible painful transformations, but – in the best case – has to live with pricing pressure, since low prices are the only distinguishing feature an ISV with a legacy business model can come up with. However, if the competition follows the same route, ISVs are quickly caught in the downward pricing spiral.

The second option is to try to make the existing software future-proof by making selective improvements. This may seem to many to be a sensible – and considering resources needed, the only feasible – way to go. But it only tackles temporary symptoms, not the cause. The real challenge is postponed, and by the time real change is due, competition may have long since made the crucial changes.

In the medium to long term, the third option is the only feasible route to follow: developing a new platform based on a future-proof architecture from scratch. The effort is enormous; but this is the only sensible way to provide customers a platform catering to must-have future requirements. At the same time the platform is based on a stable, expandable framework. Yes, this path is rocky. But there is no alternative.

The cloud is the future

One of the key points is the transition to a service cloud-based platform, moving away from an on-premise architecture. One of the main drivers is the increasing demand for global scalability: digital signage moves from national to global networks. As data-driven content and interactivity plays are more important role so does latency. Ultra-fast response time becomes the new metric and only service-cloud-based architecture is able to deliver in a highly scalable manner. AI applications in particular require very low latency for an acceptable customer experience.

A big driver for low-latency are real-time applications sending data from the backend to the DS system; but also the other way round (to analyze interactions on the screen). Especially for touch applications, a fast response is of vital importance for a satisfactory user experience.

It is also important to distinguish between storage cloud and service cloud. Most software solutions are already hosted by one of the large cloud providers Amazon AWS, Microsoft Azure or Google Cloud. Although this enables some "workarounds", it is still far away from a universal cloud architecture.

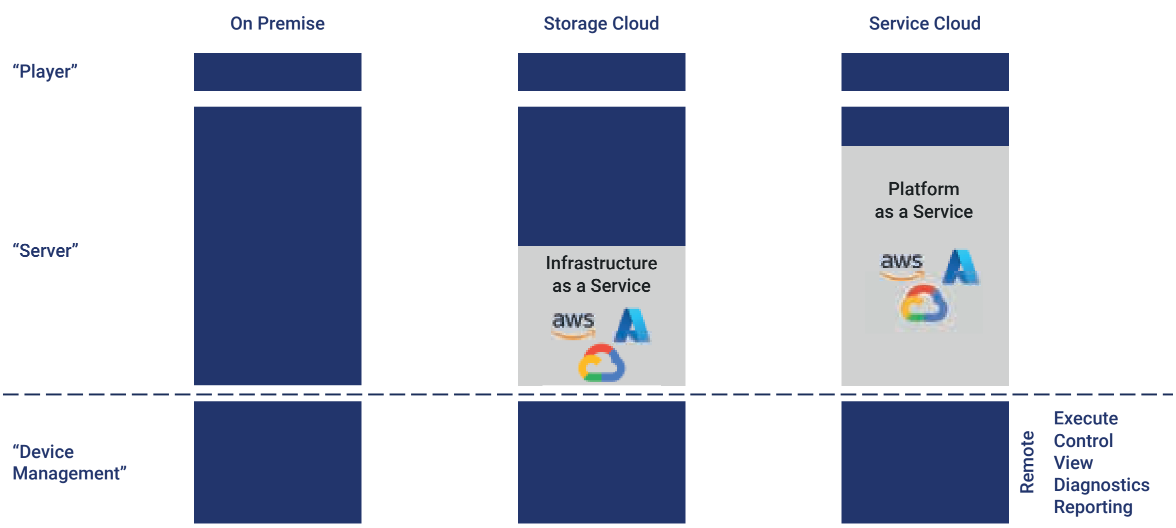
Another factor is play-out platform independence; service cloud based CMS are much more flexible in the choice of operating system, be it Windows, Linux or a SoC solution. There are also fewer legacy issues, as all users automatically use the latest version.

The service cloud also opens the door to important IT security certifications such as ISO 27001, which are becoming increasingly important for enterprise projects. A service cloud architecture also increases the speed of development for new features. A point that may seem minor at first, but also has a big impact: The battle for developer resources. Software developers prefer to work on modern software architecture, e.g., cloud based.

API first

Modern DS software is centered around the API. Because today's digital signage applications are data-driven, connections to various backend systems such as ERP or CRM as well as to IOT devices (sensors and cameras) are essential.

At the same time, the data must be transmitted in real time and securely. Encapsulated APIs are necessary for the latter. In addition, interfaces must be fully standardized to become ISO-certified.



From Edge to Cloud: There are three basic service architecture models. The service-cloud architecture is the model of the future. Source: invidis

Remote Device Management

Remote device management plays a decisive role in modern architectures. Today's DS networks must be continuously monitored and, if necessary, remotely controlled. This requires dedicated remote device management tools, which some CMS providers have already integrated into their platform – for example Telelogos – or which have to be purchased separately, as with Chrome OS Flex.

Five key functions should be supported remotely for full operational access: Remote View, Remote Control, Remote Execute, Remote Diagnostics and Remote Reporting. The extent to which each of these areas is developed depends on specific requirements; not every feature is necessary for all networks.

In the past, IT tools such as Teamviewer were often used for this purpose. However, these tools usually do not support all the specific features necessary for digital signage. Remote device management and the associated reporting are increasingly demanded by customers or must be delivered as a proof.

Pricing

Old and new software platforms differ not only in terms of technology, but also in business models. The traditional pricing model is based on a one-time license fee for server and player plus an annual service and support fee – typically 15 - 20 % of the total price. This model dominated the industry and is still base for most current projects. But it poses some problems, e.g., partners not always bundled a service contract with it. Especially with software licenses sold through distribution channels, ISVs sometimes do not even know the end user. The consequence: no customer relationship can be built up, no upselling is possible. Another challenge is if and how customers keep their systems up-to-date. If not, the software could turn into a ticking time bomb for the client.

Even if annual upgrades are mandatory – which tends to be the norm for newer contracts – ISVs still need to support various releases and customer-specific versions of their software platform. A cost- and labor-intensive task.

So-called “false SaaS” appears modern on the surface with simple monthly fees, but the architec-

Remote Device Management contains five basic functions, which come in different maturity levels. Source: invidis ture and ISV costs are still in a traditional structure. Even if the systems are often cloud-hosted, global scalability still needs tailored workarounds. The monthly fee feels like software-as-a-service, but frequent updates and upgrades are missing.

"True SaaS" ultimately means providing the software in its always up-to-date version plus additional service offerings. The pricing is also aligned with the modern architecture - and has also big advantages for the software developer. He gets a revenue stream that can be used to improve his product, and the customer always works with the latest version of the software. The included service ensures that companies can rely on digital signage as an essential part of their business model – the way to business critical signage is paved.

Conclusion

Even if developing software from scratch looks like a huge task at first: It is crucial for developers who want to be at the cutting edge in the future. Because outdated software that has been superficially trimmed to be modern can become a great burden for a company. Legacy consumes resources, outdated features must be supported. This inhibits going new ways. And to focus on the essentials. Companies with the freedom to innovate, e.g., new services or content, will win in the future and leave those behind that still have to worry about compatibility of their old features.

USE CASE

Digital Signage as a Portal

The Eye of Mexico combines architecture, LEDs and AI content to create a work of art for public spaces.

Balthasar Mayer

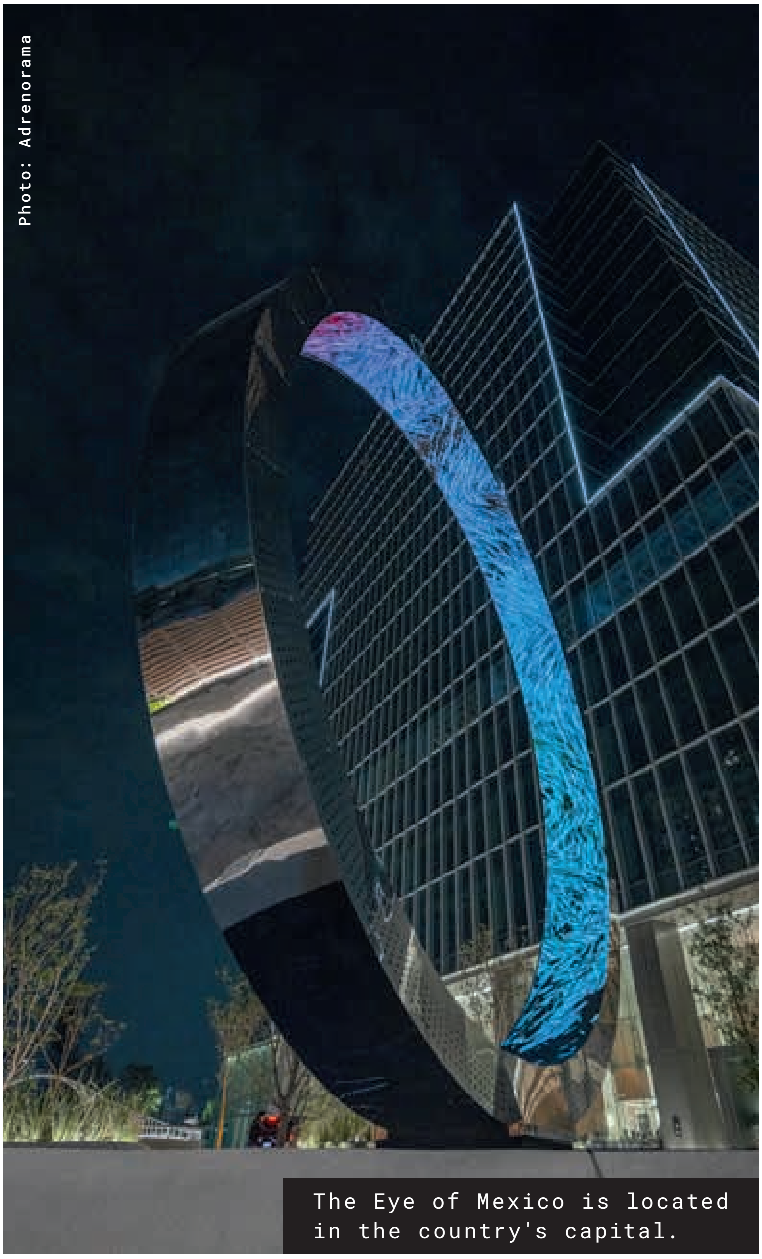


Photo: Adrenorama

The Eye of Mexico is located in the country's capital.

In the heart of Mexico City, Neuchâtel Cuadrante Polanco, a new building complex, is currently under construction in the Nuevo Polanco neighborhood. Owned by Ivanhoé Cambridge and developed by Mira, the new buildings are intended to focus on the quality of life for the residents and create a sense of community.

The visual highlight of the project, The Eye of Mexico, also serves this purpose. The digital public artwork consists of a giant ring that is lined with LEDs on the inside.

AI will be used to connect the artwork with its surroundings: the data-driven LED content of "The Eye" will contain demographic, urban and mobility data oft he citizens of Mexico City.

Beautiful technology

You will find images of the spectacular installation distributed throughout the Yearbook – as separating pages of our thematic blocks. In this way, we want to illustrate the different perspectives that together form an impressive whole: from the technology to the content to the realization. The individual components become a device that has a positive impact on people and the public space.

Cooperation between Massivart and Ouchhh

The LED ring was developed by the Canadian public art and placemaking agency Massivart together with award-winning art collective Ouchhh and its creative director Ferdi Alici. The visualization with AI follows the currently popular public art projects.

Mexican specialists Nerd Light Media, Metales and Specta acted as digital signage designers and integrators.

"The Eye of Mexico represents the dynamism of the complex and alludes to a portal that directs us towards the future of mobility. We are proud to play a role in bringing this incredible project to life," said Philippe Demers, Founder & Head of Strategic Planning of Massivart.

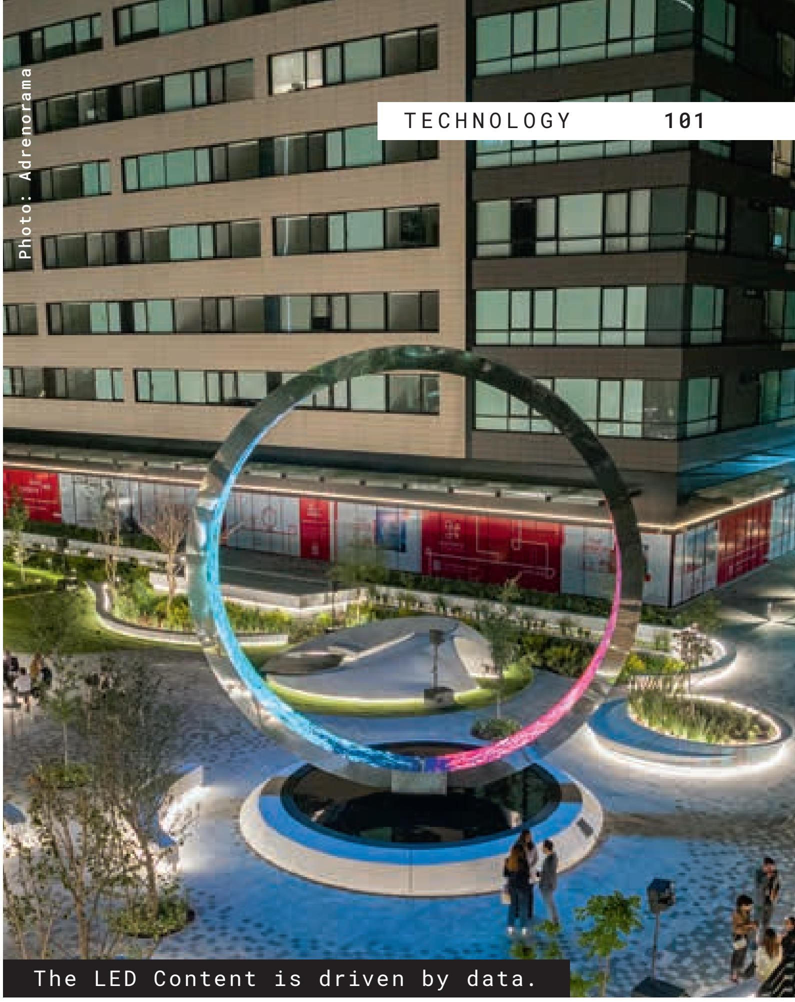


Photo: Adrenorama

The LED Content is driven by data.

Experience.
Difference.

We believe that outstanding experiences make all the difference. Therefore, our mission is to every day enable extraordinary customer experiences. Powered by our best-in-class platform. Enabled by brilliant people.

GRASSFISH

Read the story behind this picture on page 100.

INVIDIS ON SITE

Photo: Adrenorama

Photo: invidis

Impressive exit show at the German pavilion

EXPO 2020

Global Stage for Digital Signage

Storytelling through technology: The Expo 2020 in Dubai not only delivered international flair but a great deal of immersive experiences.

Florian Rotberg & Stefan Schieker

World expo – a term that stands for internationality and technological advance since the first exhibition in 1851. The equation is still valid today, only that instead of massive steel towers, immersive experiences are what visitors will remember.

The latest expo took place in the desert state of the United Arab Emirates. Because of the Covid pandemic, the Expo 2020 had been postponed from its original start date. One year later than planned, in October 2021, the nations of the earth started their presentations in different pavilions which illustrated the countries' characters and showcased technological achievements.

In terms of content, world exhibitions have never excelled in complexity and depth. But the events held every four years are a highlight for digital signage fans. More than 180 participating countries hired world-renowned architects and digital creative agencies. For six months, the desert outside Dubai was transformed into a place of ideas.

The Large Experience Zones

At the Expo, like in real life, ideas need to be sold well. The basic challenges for creators are very similar to those faced by brands in retail. After all, the exhibition site was huge, and visitors had to make a choice as to which pavilions they wanted to visit and at which ones they wanted to spend more time.

Therefore, it was particularly important to engage the visitors with stories. If used correctly, digital signage provides the ideal medium.

invidis was on site with an expert team and identified four domains that large exhibitors focused on for their pavilions:

- Exterior architecture: The pavilions needed to attract visitors with their exterior – not an easy task given the wide variety of concepts. Many tried to create an iconic architecture that offered an experience even before entering.

- Welcome zone: These zones prepared the experience. The individual concepts varied greatly. What they all shared was the use of immersive properties to trigger emotions. In Israel's pavilion, for example, a live DJane encouraged the audience to sing and clap along.

- Exhibition zone: The actual exhibition areas focused on deeper storytelling. They concentrated on detailed messaging and interaction, sometimes with more complex, future-related topics, such as mobility and sustainability. A major challenge: Attention spans are usually short, and visitors need to be guided through the pavilion swiftly to avoid long queues.

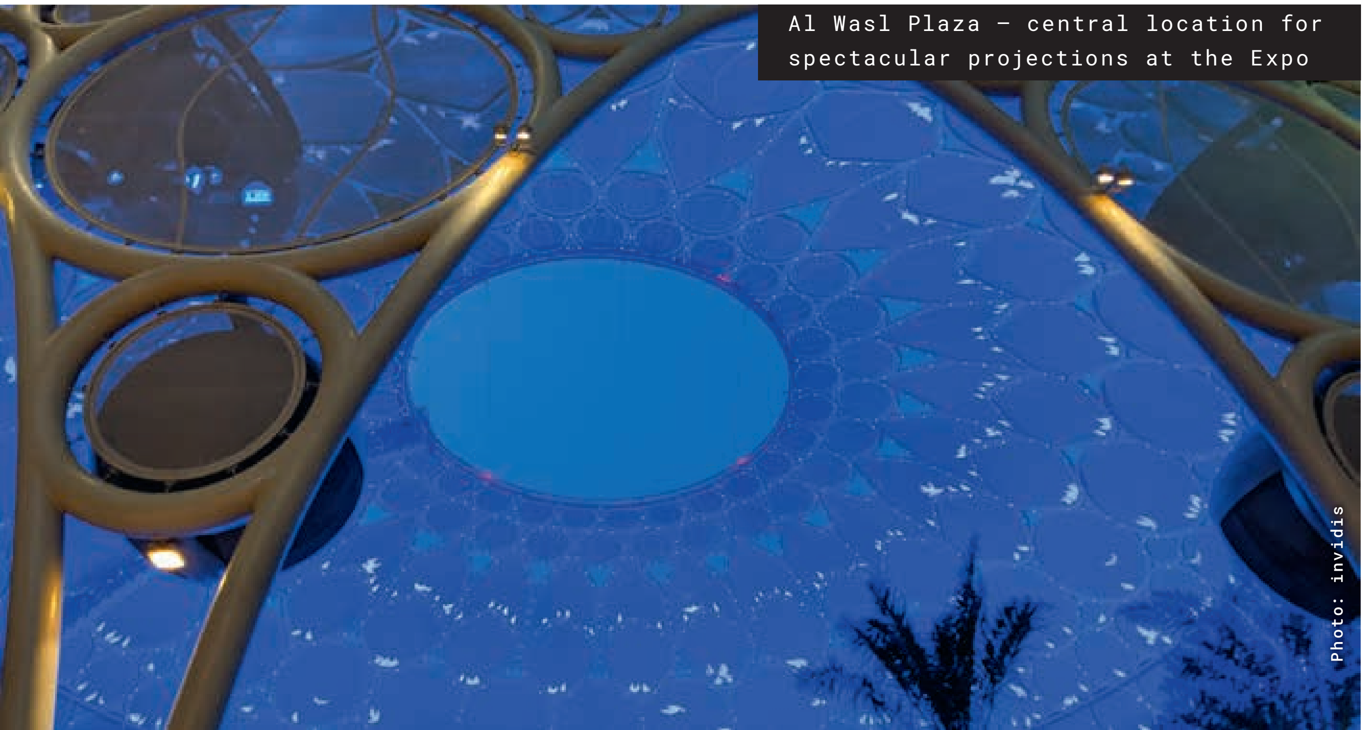
- Exit experience: The exit areas were used to convey messages and impressions. They reiterated the core message in an emotional way. The German pavilion managed this well: In a 360-degree LED room the audience was immersed through personal messaging and got involved in the form of swings.

The exterior architecture dictated the first impression. The pavilions mainly tried to stand out through special construction methods. Digital experiences were rather rare. Among the most striking were the Singapore pavilion in jungle design and the Korea pavilion with a movable cube structure. The Swiss pavilion with its mirror facade also delivered a nice introductory experience: Red and white umbrellas created an ever-changing, interactive pattern in Swiss national colors.

Digital signage and AV found their main stages in the three interior zones. Here, technologies of rank and name were brought up – from large projections over LED walls to gigantic touch tables.

Countries and Brands

Through closer inspection of the great pavilions, invidis identified the five countries offering the



Al Wasl Plaza – central location for spectacular projections at the Expo

Photo: invidis

Photos: invidis

Immersive Experiences in desert sand: the UAE pavilion.

Screens in unusual formats at the UAE pavilion

best experiences – from a digital signage point of view: the United Arab Emirates, Russia, Germany, Saudi Arabia and Spain. They all demonstrated a smart use of digital signage, especially in welcome and exhibition zone.

The UAE pavilion was a stunner from the outside, but also convinced on the inside with well thought-out digital concepts. The Russian pavilion impressed with an immersive show around the human brain. Germany presented a versatile science show, with a personal on-screen address by RFID as well as an impressive exit show. Saudi Arabia showed fascinating images of nature using LED and projection technology, complemented by water features and a large interactive table. The most spectacular experience, however, was delivered by Spain (see separate box).

Not only countries but also some large brands presented in Dubai – such as Pepsi, Cartier, L'Oréal, SAP, DP World, Siemens, and Mastercard. Pepsi placed fully automated stores throughout the entire exhibition area, as well as a Pepsi/Lays experience room. With these installations, the company focused on direct sales and brand experience. Cartier, on the other hand, put forth a strong message of equality as sponsor of the women's pavilion.

On March 31 this year, Expo 2020 closed with a grand farewell ceremony – Christina Aguilera, Norah Jones and Yo-Yo Ma were among the performers. The Expo will not disappear completely from Dubai but will evolve into the "District 2020." The micro-city will stay on as innovation-oriented business ecosystem that connects global ideas, promotes technology, and drives digital innovation. For this ongoing project, 80 percent of the buildings on the Expo site will be reused, but the immersive installations will not stay.

These experiences will have to wait for the next World Expo which is scheduled to take place in Osaka, Japan, in 2025.

The Expo at invidisXworld

To capture the immersive potential of the projects, invidis created a video series for our Youtube channel invidisXworld where we presented the Top5 of the best digital signage country pavilions. We also took a look at great executions of digital storytelling and major brands staging themselves in different ways at the Expo 2020.

The Spanish Pavilion

The Spanish pavilion was ranked number 1 among the digital signage pavilions by invidis – although the experience did not convince from the start. The architectural construction was not especially astonishing. At closer inspection, the climate-friendly design was certainly interesting: It used conically shaped towers to support natural building cooling. But it lacked the wow effect.

The impression changed upon entering the atrium. Suddenly immersed in a huge room, visitors were led downward through a spiral-shaped exit. An eye-catching element was the digital-real sculpture Dynamo by artist Daniel Canogar.

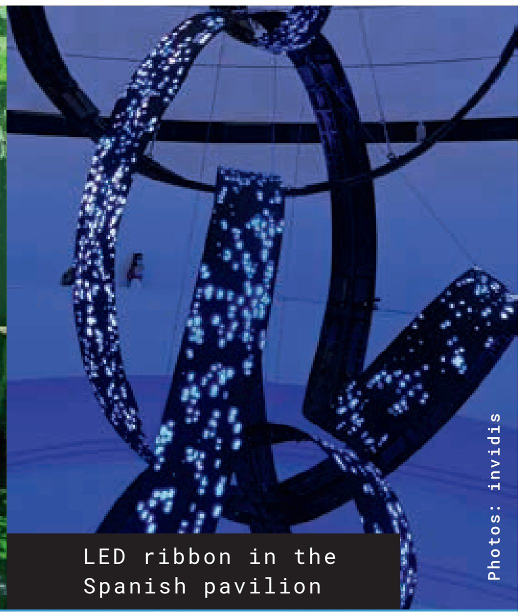
The exits also served as a waiting area for a film screening that followed. Visitors could use the time to observe the interactive artwork made of LED ribbons: Sensors on the railing of the ramp registered the visitors' hands. With these data the algorithm created a unique and unrepeatable audiovisual pattern each time.

Matching sound completed the immersive experience in the room. Unlike in other pavilions, the inspiration was not conveyed through storytelling, but through an art installation.The subsequent film "August Moon" by Nacho Vigalondo fell short in comparison to this impressive installation.

To highlight topics around sustainability, the "Forest of Intelligence" used a firework of different signage technologies: projection on objects, interactive projections on the floor, LED displays, transparent displays, interactive exhibits et cetera. The technology was used in such a way that it really contributed to knowledge gain, explaining exhibits and topics in more detail.

The subsequent room illustrated some technological showcase projects in Spain on displays – not spectacular from a digital signage point of view. The accompanying Hyperloop construction was nice to look at but seemed a little out of place to the invidis experts. At the exit, a curved corridor was illuminated by strips of light running along the floor. No digital signage, but beautifully done and a worthy conclusion to a very fascinating country pavilion overall.

The "Forest of Intelligence"



LED ribbon in the Spanish pavilion

LAS VEGAS

Is Bigger & Brighter Always Better?

Mega screens, thousands of gambling machine displays, and a gigantic LED globe: At Resorts World in Las Vegas, bigger is apparently better when it comes to digital signage. Subtle integration details are not always considered.

Florian Rotberg

More than 40 million visitors come to Las Vegas each year for three days on average. A large number of them will check into one of Resorts World's 3,500 rooms and use its hundreds of slot machines. The billion-dollar investment by the Asian Genting Group – which markets its hotels under the Hilton brand – also included many millions for digital signage.

The LED façades on the hotel tower and the large-format LEDs in the base construction at street level are a captivating sight. Thousands of

Gambling is nowadays almost exclusively digital.

Photo: invidis

Resorts World: The LED show starts on the outside.

Photo: invidis

square meters of LEDs were installed, not only to promote the hotel and its events on the outside, but also as probably the largest DooH space for third-party providers. During the Infocomm 2022, the hotel booking engine Hotels.com as well as several vodka and tequila brands used the prominent hotel façade for their advertising.

Mirror Globe

On the inside as well, guests will find LED in every corner – for example at the entrance of the hip Zouk nightclub or in the form of a reflective LED globe, certainly one of the most unusual digital signage concepts in Las Vegas at the moment.

→

The LED globe in the Resorts World has a diameter of 15 meters.

Photo: invidis

The globe with its shining surface is 15 meters high and made of triangular LED elements. The special format was built by North American LED manufacturer Pledco. The more than 40 differently sized triangular LED PCBs consist of 8,600 LED modules with a total of around 12.6 million pixels. It took Pledco nearly two years to design and construct the Resorts World Globe with its mirror surface.

Although an eye-catcher, the globe's utility may be questioned. To say it looks chic may suffice.

Display setup in one of the numerous casinos

Photo: invidis

Money-Making Displays

Undoubtedly useful are the thousands of displays in and around the gambling machines, the heart of the gambling metropolis. Slot machines are now fully digital and equipped with all kinds of screens: crooked, curved, with and without LEDs. The sheer number of them at Resorts World is overwhelming. Safe to say that around four to five thousand open-frame displays were integrated into Resorts World machines alone.

The globe is made up of more the 8,000 LED elements.

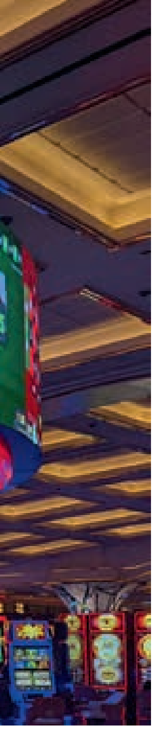
Photo: invidis

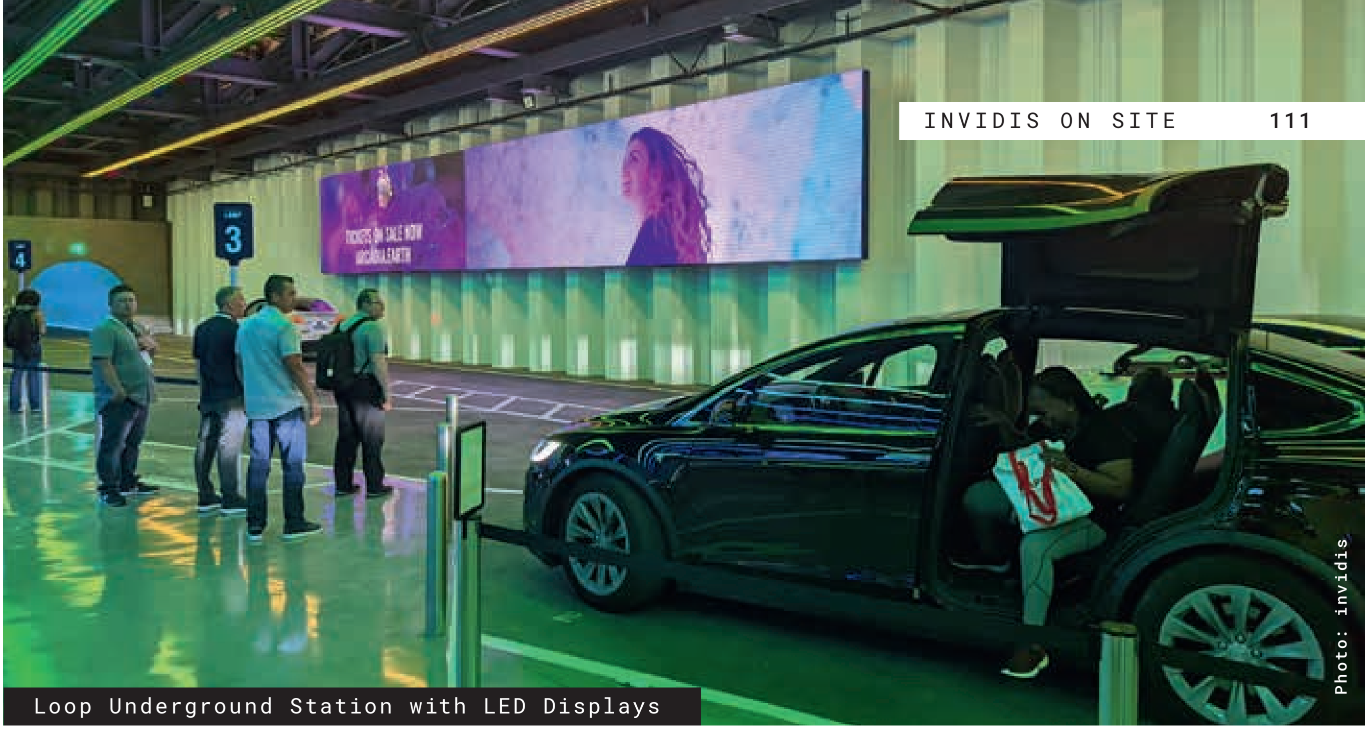
Not Pretty, But it Works

Next to the blinking machines, players diligently charge money onto the Resorts' own cards at the loading stations. With a few exceptions, the days of coins and bills are over. Cashless gambling is the new state of the art in Las Vegas. The transaction terminals are equipped with huge screens, an unusual choice for this use case where privacy matters. Las Vegas, however, is practical: Here it suffices to stick a simple privacy film on the lower part of the large-format displays. Not pretty, but it works.

Other touchpoints are equally lacking in aesthetics: Touch-based ordering terminals in the food court at Resorts World are installed on columns, visibly connected to the power supply and to the separate payment terminals with long cables. This is exactly the use case that Samsung and LG are addressing with their all-in-one kiosk terminals.

A new casino-hotel building only opens every few years in Las Vegas. It is fascinating to see what a dominant role digital signage can play on the outside and the inside in today's world. It turns façades and large areas into immersive experiences and landmark highlights.





Loop Underground Station with LED Displays

Photo: invidis

LED in Tesla Tunnel

Much has been said about the Tesla Tunnel. Loop Vegas is a typical Elon Musk project: "Over-promised but underdelivered." And yet, it is impossible to escape its fascination. invidis took a test drive during Infocomm 2022.

On the outside, the station in front of the new West Exhibition Hall resembles a bus stop. Passengers queue up at ten bays and wait for their individual driver. Luckily, the station is covered by a roof. In Vegas weather with temperatures reaching 43 degrees Celsius, waiting in a suit becomes a hot affair within minutes.

Every minute, one Tesla after the other shoots out of the tunnel – more than 70 Teslas operate simultaneously in the 2.5-kilometer-long tunnel. In the tunnel, the electric car speeds up to 50 km/h and reaches the central stop after just over half a minute.

A New Mobility Experience

The underground stop, currently the only one, resembles a subway station. The walls are covered with high-resolution DooH LEDs – to date the only source of revenue for The Loop Las Vegas. Elon Musk is building The Loop at a fixed price; the operator is one of his associate companies. So far, the drive is free for passengers. Not an inexpensive venture for Elon Musk.

The underground user experience is great: LED lighting and ultra-high definition DooH LED are an astonishing sight. Above ground, however, the stations are less than spectacular, and difficult to locate. The station would have great potential as an out-of-home location, an opportunity left unexploited.

In the coming years, the tunnel network is expected to connect all casino hotels on the Strip and the airport. Future stations are supposed to look less elaborate and more like a cab stop. This is probably how The Loop is best described: an evolution of the cab concept instead of a new subway system.

Elon Musk's plans certainly do not lack style or vision: He wants to extend The Loop Vegas all the way to Los Angeles. At 250 km/h, the entire journey should only take 1.5 hours through the 400-kilometer-long tube. By then, we will have visited the Infocomm in Las Vegas a few more times.

IKEA

Retail Experiences Reinvented

A hotel, digital signage and kiosk terminals: At Vienna's Westbahnhof station, Ikea opened a new furniture store prototype for city center customers, where almost everything is done differently.

Florian Rotberg

It is no secret that Ikea is constantly reinventing itself: shopping malls, stores with a recreational roof park or pop-up stores are part of Ikea's new store formats. For the digital signage industry, the digitization of the customer journey and the role of digital touchpoints in home improvement stores aka furniture stores is of particular interest. With the location at Vienna's Westbahnhof station, Ikea opened the first store belonging to a new inner-city concept that blends into the cityscape and contributes to making city life as car-free as possible. Parking spaces, for instance, have been completely dispensed with.

Modern architecture, green facades and a hotel which has been integrated into the building are not at all reminiscent of a typical Ikea furniture

With the Vienna location, Ikea is testing a new store concept.

Photo: IKEA

Digital Signage is part of the Vienna store concept.

store. The result is a shopping destination on seven floors that resembles more a hip department store than a self-service furniture store. The Swedes have managed to reinvent the shopping experience while still offering the full range of products.

Shopping via App

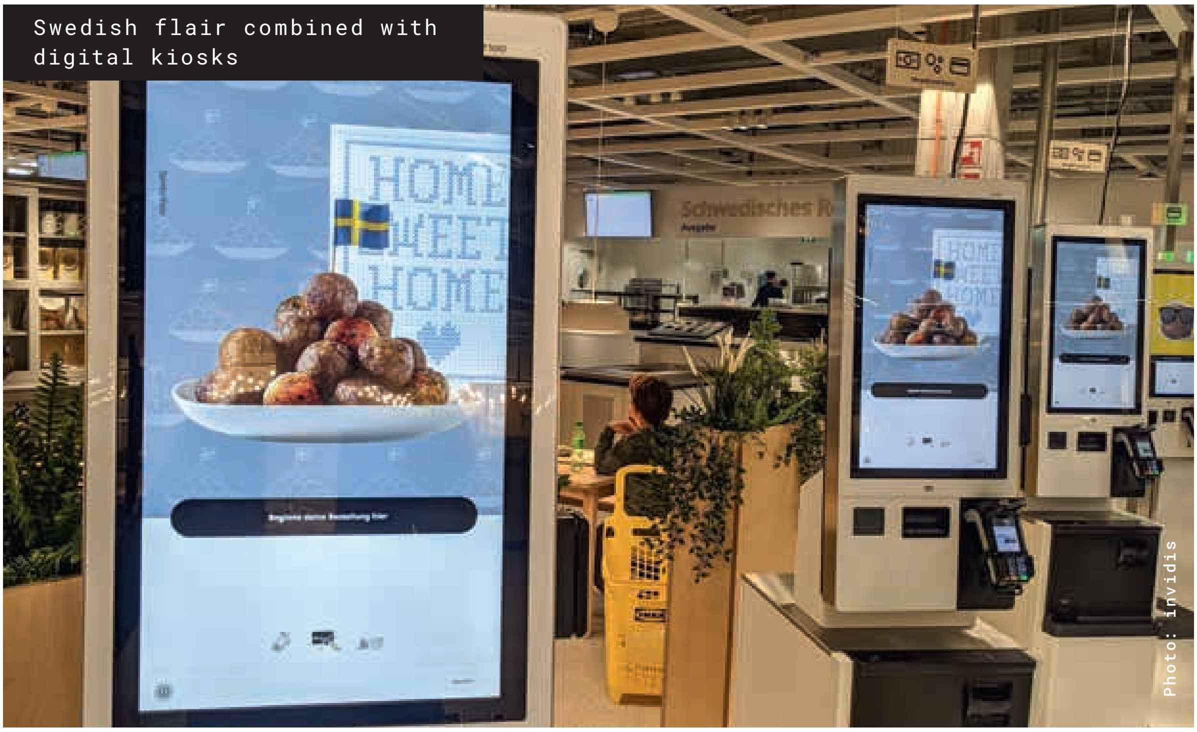
The typical Ikea store zones, like the market hall, are distributed over five floors. The takeaway products are thematically assigned to categories – kitchen, living, sleeping and so on. The checkout zone at the exit has also disappeared, with self-checkout counters available on every floor. Of course, Vienna's Ikea also offers omnichannel shopping via app. Customers simply fill their virtual shopping cart and pay at kiosk terminals. Larger products are available for same day home-delivery with zero emissions, so customers do not have to worry about taking their car. Most interesting for the digital signage industry is how Ikea is integrating displays on a large scale for the first time. Well over 100 displays are dispensed over the floors. However, shoppers in Vienna will not see any spectacular WoW installations. Instead, many small (12") displays are complemented by large format displays (75") and a few video walls. The majority of digital touchpoints are non-interactive (Digital Posters), intended to provide both product inspiration and additional product information. To complement the purely informative public screens, customers are encouraged to use the Ikea app. The integration of the displays is also kept simple – primarily plaster mounted or visibly suspended from the ceiling to retain flexibility for frequent redecorations. Accordingly, the power and network supply is implemented neatly but often visible. The permanent displays, which can be found at the checkout and other areas, do have hidden cable infrastructure.

A Touch of QSR

For instore signage and way guiding, Ikea relies on static signage. An exception are the restaurants where order terminals are generously distributed. Premiering in Vienna are the sided order terminals from Diebold-Nixdorf, very similar to the tens of thousands order terminals in the QSR industry. Both usability and screen design follow established processes from McDonald's, Burger King & Co. – a technology Ikea visitors should be familiar with. Many LFDs used as menu-boards or queuing systems throughout the restaurant show the status of orders and inform clients when orders are ready for pick-up.

Naturally, the furniture house also utilizes entry control solutions. At the entrances, Ikea relies on a solution from Checkpoint – a trend we are

Photo: invidis



Swedish flair combined with digital kiosks

Photo: invidis

observing more and more frequently. At the start of the pandemic, established retail technology providers, such as merchandise security specialist Checkpoint, lacked the flexibility to offer customers their own solutions. Typically, global enterprises are slower to react to changes in the market. In the medium and long run, however, they usually win by reaping their market power and installed sensor base. According to invidis information, Zeta Display is Ikea's worldwide digital signage partner. The solutions are based on Zeta Display's Engage Plus CMS on Tizen and Samsung as display partner.

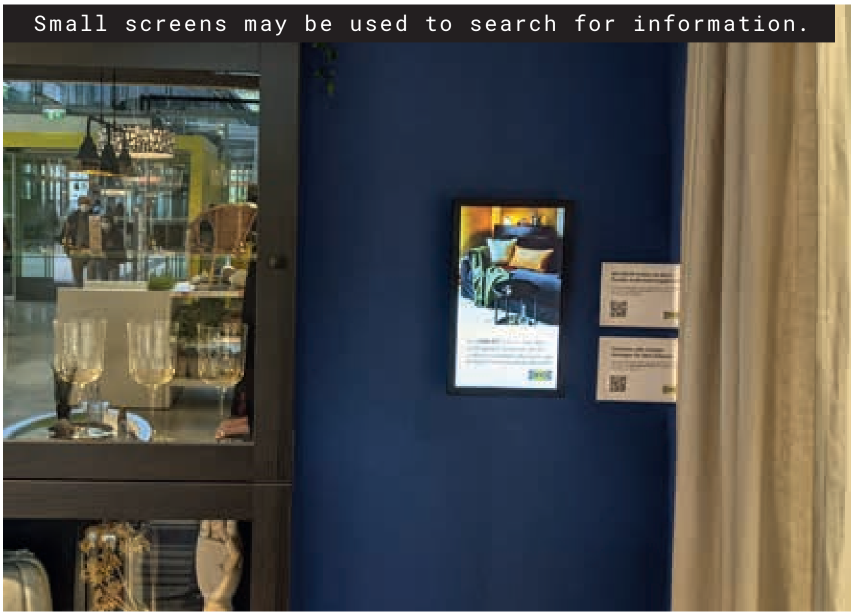
Refreshingly Different

With its new downtown concept in Vienna, the Swedish furniture store shows how customer journeys formed over decades can be disrupted and adapted to changing needs. A visit to Ikea at Vienna's Westbahnhof is refreshingly different. From a digital signage perspective, the new concept confirms one of the main benefits of displays: offering information while bringing ambience and emotion to a confined space. It also confirms that for highly standardized restaurants, order terminals have become business critical.

Of course, there would have still been room for some digital Wow installations in the new store. We do assume, however, that there may well be large LED and video wall installations again in other locations, if the overall architectural concept permits.


Video Walls create ambience in the showroom.


The small screens are integrated into the overall concept.

Small screens may be used to search for information.


Digital kiosks at the bistro


Photo: invidis

Photo: invidis

Ikea concepts

In the past, the Swedish furniture supplier only built its stores in commercial areas. Today, there are also city center locations in various formats – even integrated into a local shopping mall. Many roads lead to Ikea, and the furniture giant is looking for a suitable concept for each road. The different store solutions include:

Big Box: The traditional, windowless blue-box industrial architecture is mostly located in industrial parks on the outskirts of metropolitan areas. The entire product range is available in the showroom and for pick-up.

Inner City Store: A format found in Vienna, London, Copenhagen, and Stockholm, amongst others. The individual, modern, bright, and open architecture complements the inner-city location. The stores are designed to blend in with other stores and the neighborhood.

Planning studio: Kitchen, bedroom, and office need to be planned in detail and often require the assistance of Ikea employees. Ikea planning studios in city centers offer a planning service close to where customers live and work.

Shop-in-shop: Especially in Asian cities retail spaces are scarce, and not many people own a car. To reach customers in spaces like these, Ikea is opening smaller shop-in-shop stores in supermarkets.

Shopping center: In some countries, Ikea and its mother company Ingka operate shopping centers where Ikea acts as Ingka's anchor tenant. Recent projects even include hotels and residential buildings.

Pop-up: Like most retailers, Ikea rents pop-up spaces in shopping centers or pedestrian zones for short-term promotions.

Information about sustainability is integrated into Ikea's digital signage concept.

Photos: invidis

ADIDAS

Sustainable and transparent

"Renew Berlin" is the theme of the new Adidas flagship store in the German capital. The sustainability concept is accompanied by digital touchpoints and transparent LEDs.

Florian Rotberg

Flagship stores and advanced retail concepts are a luxury not every brand can afford. This is often exclusive to global players who have the resources to be ahead of their time. A good example is the new Adidas store in Berlin that opened in December 2021. The trendsetting shop, in short distance from the Kadewe and the Kaiser Wilhelm Memorial Church, shows how sustainability and digitalization can be fully integrated, enabling brand experiences at the highest level.

Bridging the gap between being green and being digital requires will power and belief first and foremost. This ambition is reflected in the theme "Renew Berlin": For the construction of the store, Adidas used untreated OSB panels. For natural air purification, they integrated greenhouses. At the same time, Adidas used LED in a variety of forms – transparent at the entrance, high-resolution in the shop windows and as a digital beacon around the elevator shaft.

The store entrance is lined with transparent LEDs.

Photo: invidis

Familiar from other stores are the many digital touchpoints, like the interactive mirrors in the locker rooms and the LEDs in the shelving system for soccer shoes and in podiums. Unfortunately, Adidas continues to use highly reflective large format displays that make it difficult to see the content clearly.

A digital signage highlight are the transparent LEDs in glass panels at the entrance area. For the first time, transparent LEDs are integrated in a visually appealing way – both from the front and the back. Another ideal stage for digital storytelling are the high-resolution LEDs in the shop windows. Surprising to us were the LED panels that cladded the elevator shaft – a solution that created great atmosphere but was somewhat disappointing in terms of content. A technology that remains one of the most advanced in the industry is Adidas' integration of their app in the customer journey. It is both easy to use and adds value to the use cases.

The consistency with which Adidas implemented the topic of sustainability in the store is fascinating. From natural air purification via high-performance plants to the use of natural materials and a Green Lab where even the tarpaulins from the construction site are made into bags. Symbolic of the store's Renew Berlin theme is the ceiling-high sculpture "Become 2021," which depicts a circular process and emphasizes the company's commitment in this area. The displayed "Futurecraft Loop," a fully recyclable running shoe, serves as a concrete manifestation of this commitment.


An eyecatcher is the LED cladding of the elevator.

Shoe presentation through a LED wall


The sculpture "Become 2021" is designed to represent the sustainability concept


Many digital touchpoints were used in the store, as expected.

All Photos: invidis

Photo: invidis

The House of Superstep in Istinye Park opened in 2021.

YOUNG FASHION

Brands, Beats and Basketball

The concept store chain House of Superstep in Istanbul is fully focused on a young audience. Its consistent targeting is convincing – from leasure activities to digital signage.

Stefan Schieker

The House of Superstep location in Istanbul's Istinye Park calls itself a community center for urban and street culture. And indeed, it feels more like a place where young people like to hang out than a traditional store. Although many well-known sneaker and urban lifestyle brands are represented here – such as Converse, Lacoste, Nike, Adidas, Vans, Puma, TNF, Timberland, and New Era – they are displayed in a special, refreshing way.

Upon entering the "store," which first opened in March 2021, the visitor is welcomed by hard-hitting beats mixed by a live DJ. The House of Superstep itself encompasses different experience zones, ranging from brand areas and theme zones to activation areas, customization services and activities. Then there are the social areas: a tattoo parlor, a mini basketball court, and a zone for gaming. Not that any of these elements are new to retail – except perhaps the tattoo parlor. But it is the very consistent integration of all these elements into one concept that strikes a perfect chord with the target audience.

Wire fences and screens

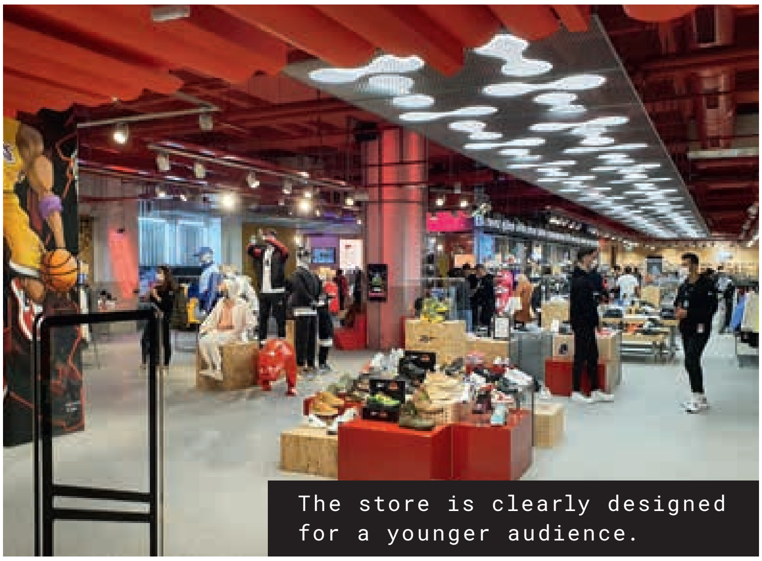
In terms of digital experience and digital signage, the House disposes of a wide range of technologies. On top of the loud music, the entire store appears flashy. But again, consistent with the target group.

The entire design revolves around a LED ribbon which runs through a large part of the store. LCD panels placed throughout the shop show multicolored, fast-cut content. Although rather randomly distributed, they harmonize with the rest of the design, which is characterized by wire fences and MDF panels. Behind the counter, there is a large LCD display. In the shop window, an arrangement of screens is placed to attract customers. Again, everything is consistent with the concept – even though one of the screens showed signs of failure every now and then.

Finally, there are some implementations of projection technology, and a kiosk terminal at the entrance with content adapted to the target group that invites customers to interact.

Not all digital technology used is perfectly implemented. Some of the projections, in particular, lack adequate brightness. Overall, however, the digital elements provide the flexibility to give each area its own identity and atmosphere, and to capture the attention of the young, digital audience.

The store design is characterized by LCD displays and a LED ribbon.



The store is clearly designed for a younger audience.

The store even has a tattoo parlor.

All Photos: invidis

Screens in the shop windows of the House of Superstep

DIGITAL SIGNAG 101

Read the story behind
this picture on page 100.

E

Photo: Adrenorama

DIGITAL SIGNAGE IN ACTION

The Digital POS – A Journey With Many Routes

Centers of experience with homogeneous customer journeys versus “hang-&-bang” installations: Why cleverly deployed digital signage is relevant for both big brands and small stores.

Guest article by Markus Deserno

Of all the digital signage installations in the big shopping streets, shop window screens are the ones that attract most attention these days. And with good reason: They are what turns strolling into shopping.

The pattern repeats itself in almost every single major shopping street in Europe, even though there are some cutbacks when it comes to Germany. The density of shop window installations here is not comparable with the rest of Europe. From a project perspective, the country presents itself as a patchwork with significant differences regarding the different local regulations. Every city in Germany handles the use of digital media in shop windows differently. Moreover, single streets and city districts have additional regula-

Many digital signage installations are designed to bring customers into the store.

tions, some of which are very old and no longer state of the art.

Nevertheless, many things have changed for the better in recent years. The quality of the shopping experience has improved on many levels – starting with the changing rooms that have been refurbished with good lighting, sufficient space and, from time to time, digital support systems.

The sales floor, too, has received some attention. A couple of years ago, displays were installed only in areas where there was still room, not in the places that were important for the visual axis, the communication, or the layout of the store. Planners and implementers have progressed massively here.

Another improvement is that digital media is now increasingly integrated in the places where it is has relevance. Screens that hang unmotivated and helplessly on the wall have become rare. Most of the time now, you see adapted housings and modules in which they are integrated.

The Journey Started Prior to the Pandemic

The improvements already started happening before the pandemic. Before the big retail standstill, some brands and chain stores had started implementing digital and customer-centric solutions.

As expected, the major brands and market leaders were the ones at the forefront of this development. Every planned restructuring and every newly implemented solution aimed not only at making the shopping area more relevant but at increasing productivity.

The path to increasing efficiency was in many cases one of trial & error. Touchpoints were often tested in flagship installations. As a yardstick for the proof of concept (POC), clear requirements and measurable results were defined in advance that served as the basis for every test.

In hindsight, this method has proven to work best to assess changing buyer behavior in recent years: Asking what customers want, expect and, ultimately, what they use.

In the test phase, many touchpoints did not meet the customers' requirements. Others passed the practical test successfully; still others showed potential but had to be modified.

In the next phase these successful touchpoints were implemented in more areas and stores based on the initial results of the POCs. This proved the feasibility of store digitalization – both to employees and customers.

In large organizations, touchpoints only find their way into the stores when relevant to customers or employees – or when meeting other KPIs. It will now be exciting to see how touchpoints will perform in smaller branch systems.

Complexity Is Not Always Required

In addition to the clear trend towards interconnectedness, the market for less connected solutions must not be ignored. Currently, it is still the largest, with lots of room for improvement. Even if rollouts are smaller and more local, brands and agencies are always able to create special experiences and installations for their customers.

Here, the focus lies on other objectives which, however, can also be served and solved using the available hardware and software technology.

Thus, not every store is a complex network of interactive possibilities, quite the opposite: The majority of installations are based on clearly defined rules and experience of the brands. These are, however, routinely adapted and are based on known key figures and targets.

Many of these installations still cater to emotional marketing, to gamification, and to customer loyalty with basic quality statements concerning the products.

The CMS is where the complex work takes place, addressing customers and site requirements. A direct connection to customer databases is rather rare or limited to a few relevant data.

Nevertheless, classic signage can still create a world of experience for the shopper. With a manageable depth of integration, it will remain relevant in the near future, even if it cannot offer the convenience of highly integrated solutions.

A big trend across all segments is the communication via large LED walls, another area where a large-scale

→

Big brands also use small screens.

development and learning took place during the past few years (see also the article starting on page 130).

Besides the fact that pixel pitches are continuously becoming smaller and better, the medium is also being handled at a higher level in terms of content and relevance. Fixed formats are disappearing, and technology is enabling clearer forms of addressing and communication.

Furthermore, the use of projectors and touch systems also shows that targeted communication and interaction are the key.

All Senses Are Involved

Topics that are currently not on the immediate agenda in this environment are scent and sound. Scent is a feature that is not yet widely used by many brands and only on a tiny scale by some small companies. However, it represents an opportunity for brands to be recognized immediately and is part of the store orchestration.

The topic of sound is another one I would like to address. And I am not referring to elevator music here. Sound is an area greatly affected by price pressure. In the end, you get what you pay for. With a background music mix that neither fits the brand nor the location but annoys employees and customers, it is quite easy to undo the effects of other digital communication tools.

Sound and scent are perceived through the subconscious, which makes them powerful tools as the first cornerstone for the perception of the brand. Fortunately, however, there are some companies in Europe that excel in driving its relevance by serving and advising on this topic.

In the end, all levels of the customer journey contribute to the experience, the brand perception, and the success.

Both Ends of The Spectrum

To summarize, relevant digital communication is growing, as is the will to learn both by the marketing departments and the customers. While integration still often lacks the depth, “nice to have” installations are no longer satisfactory.

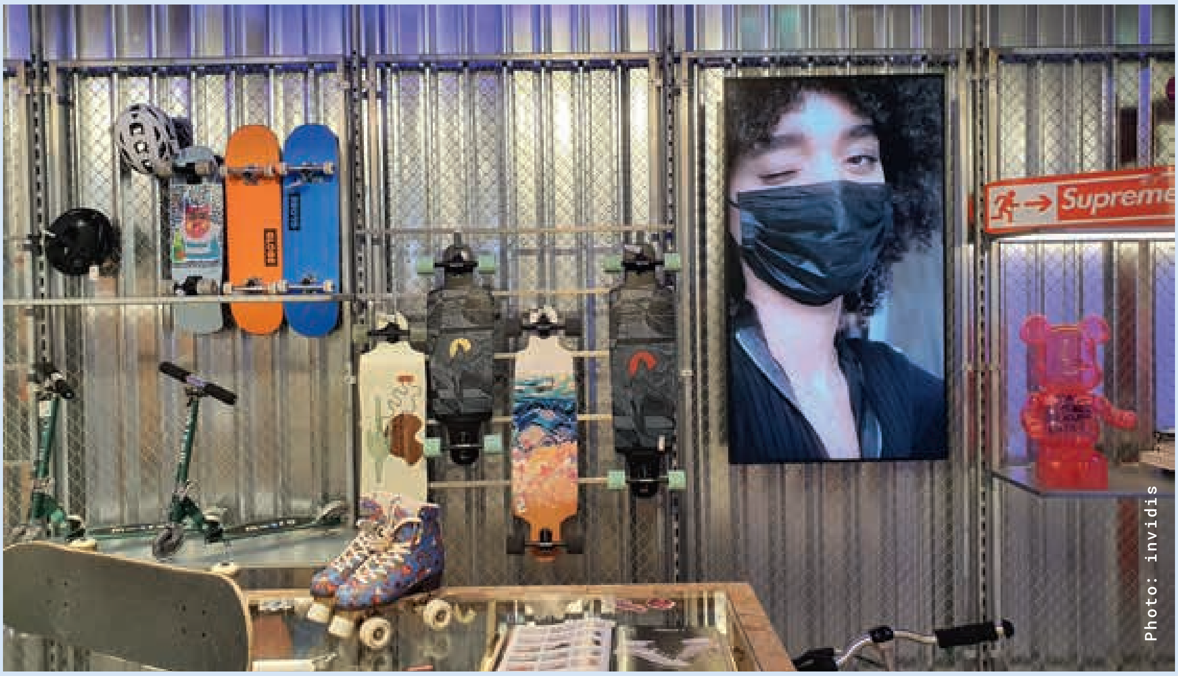
Fully integrated solutions with data connections are a different league, but basic systems can also be used and designed successfully and efficiently without full integration. It is important to connect and use the various possibilities available – if necessary, manually and without data connections. In this way, brands can still create relevant experiences for their customers, based on what they know and what they can do.

Digital signage done differently at Louis Vitton.

About the Writer

Markus Deserno is partner at invidis impact. Prior to that, he was involved as a co-founder in building Seen Media into one of the largest and most innovative full-service integrators in the DACH region.

invidis impact is the newly founded consulting unit of invidis consulting. It offers practical consulting support and interim management, for example, for go-to-market projects, technology and software topics, operational performance optimization, and support for post-merger integration processes. In addition to Markus Deserno, the impact team also includes Daniel Oelker and Marco Wassermann.



Which role will digital signage play after the effects of Covid-19 will be visible?

STORES AND DIGITAL SIGNAGE

The Post-Covid Era of Retail

The pandemic did not so much trigger a revolution in how retail works as it sped up a digitally-driven evolution that was already well underway in stores – from small shops to giant big box stores.

Dave Haynes

Many observers and insiders have commented that the digital transformation plans already in the works at retail banner head offices were accelerated by Covid-19's impacts, shifting from years of gradual adoption to months of rapid, sometimes wholesale changes.

Whenever there are changes in what has long been familiar – particularly for everyday shopping – there is a need for effective communication. That has meant that digital signage technology – often seen as a nice complement to store décor and experience – has become an important, arguably essential part of day-to-day store operations and customer messaging.

Making Cash Registers Redundant

Heavily-automated, "frictionless" grocery and convenience stores – using AI and sensors to let shoppers pick up what they want and by-pass traditional check-out counters – were first launched as a means to control staffing costs. But chronic staffing shortages across retail in the past 2.5 years – particularly in retail sectors where low wages and high turnover are common – have meant these somewhat autonomous stores now offer a way to keep doors open in tight labor markets.

A key feature of these stores – such as those using Amazon's Just Walk Out technology – are digital signage screens at the entries and around the stores, explaining to shoppers how things work, and what they should do.

Effects of the Pandemic

Labor shortages and health safety concerns have also accelerated the adoption of interactive displays – not only for checkouts and payments, but for answering questions, taking orders and managing things like customer service line-ups and enquiries.

At the start of the pandemic, the conventional wisdom was that touchscreen manufacturers were facing a doomsday scenario. But the touchscreen business prospered through the pandemic, because the health safety risks were higher in forcing one-on-one staff-customer interactions than from encouraging the use of self-service touchscreens.

Automated screens at entryways that metered and controlled access to busy stores – to meet capacity limits mandated by health authorities – saw much more adoption in Europe than in North America. But what did grow more common is the management of customers. Queue management systems – with screens and audio cues directing waiting shoppers to available checkout positions – are now more prevalent in retail.

Prevailing against Online

The other macro outcome of the pandemic has been a heightened need for retailers of all descriptions to provide compelling reasons for consumers to come to their stores, and to return.

Lockdowns and health safety worries prompted a spike in the adoption and steady use of online shopping, speedy home delivery and options like curbside pickup and Buy Online, Pickup In Store. Marketing messages like "Everyday Low Prices" no longer pull people in, because those same prices are online and delivery is free, easy and fast.

That has meant retailers have to work harder at delivering experiences when people do come through their doors. At big flagship retailers – particularly for athletic wear brands like Nike and Adidas – experience means ambitious, digital-first stores filled with multi-sensory technology. But for everyday retailers, digital experiences are more restrained.

The retail giant Walmart, for example, is trying out a new, cleaner store design that makes flat panel displays and contextual, triggered messaging part of large-form merchandising displays. The design shifts the focus from

For customer management, digital signage will become relevant in the future.

Walmart integrated small screens in their newest sales displays.

Design of a Walmart shelf with many small displays

pure mission-driven, get-me-in-and-out-of-here-fast shopping navigation, to one that allows time for discovery and experience. In the Walmart "incubator" store, a tiled video wall at eye level in the men's grooming section helps shoppers decide on shavers and trimmers.

The iconic department store chain Macy's recently announced a new marketing direction that celebrates individualism, called Own Your Style. The store says "customers will receive style guidance from digital screens throughout the store, featuring style inspiration, plus visual product displays including shoes and bags cross-merchandised with outfits to provide style advice directly on the floor."

Adaptive Messaging

A subtle element of using screens in tech-forward retail environments is tailoring the messages and calls-to-action to shopper profiles and behaviors. Harvesting, understanding, sharing and using data is now much easier across the varied systems used in retail. That means the messaging on digital signage screens can be steadily and dynamically informed, shaped and triggered by the insights provided by the data.

In real-world terms, that means when a store's inventory management system flags low stock levels for a product, the video "spot" for that product auto-disappears out of screen playlists, instead of continuing to encourage shoppers to buy something that's not actually available.

Similarly, audience measurement systems can dynamically inform and shape the optimal messaging for screens based on consumer profiles and patterns that change through days and weeks. Messaging can better match the shifting characteristics of shoppers through different time periods.

The Moment of Truth

The first wave of digital signage adoption in retail saw screens sprinkled around stores, from the entryway to the power aisles, trying to inform and influence shoppers on their paths to purchase. Suspended from ceilings and fixed on available walls, flat panel screens often looked like add-ons to store designs, were not in natural lines of sight, and did not have the desired impacts.

Post-Covid, screens in stores are getting closer to the so-called "moment of truth" – when shoppers are in the aisles, poised to put something in their basket or cart. That is hard to do with conventional digital signage screens, because flat panel displays eat up space reserved for stocked goods. So companies like Atlanta's Bluefin and Florida-based Instore Screens make and market small form-factor screens that easily nest with goods in merchandising displays, or retrofit the shelf-edges or headers on in-aisle or end-cap fixtures.

What's the Essence?

Each year, trade shows and conference see new display technologies touted as the next big things for retailing: quasi-holograms, glasses-free 3D displays, interactive tables, gesture-based "experiential" screens, big screens paired with mirrors, and on and on. There are exceptions, but there tends to be more buzz than buy-in by retail operators.

There will always be a demand, and room, for technology that creates some visual excitement and gets people talking about stores and experiences. But in this post-covid environment, what matters are solutions in line with simple, timeless attributes like convenience, speed, relevance and the affinity a store has with its target shoppers.

Digital signage can deliver all that, but it is less about pixels, brightness, scale and visual novelty, and much more about where screens are positioned, why they are there, and the relevance and timeliness of the on-screen content.

DS Check for Retailers

What to do as a retailer now to get into digital signage:

- Think about business objectives first. Promotions? Experience?
- Establish the nature, source and frequency of creative.
- Determine where screens will have an impact, not just where they will fit.
- Ensure chosen management technology can integrate and work with other store systems.
- Involve multiple departments – such as IT, store design, operations and merchandising – in planning.
- Think beyond launch and have operating and creative refresh budgets in place.

LED TECHNOLOGY

All You Need to Know About LED

Pixel pitch, resolution, brightness, distribution channels and the latest technological developments: What resellers and end customers should know about LED video walls.

Guest article by Susanne Gomez

Since the invention of the light bulb, no light technology has revolutionized the market quite like Light Emitting Diodes, in short LED. They are now used almost everywhere. As LED videowalls, they are shaping the digital signage market with growing success: in retail store windows, as displays at trade shows and conferences, or as large-format display boards and ribbon displays in sports stadiums, train stations, airports or roadside as an Out-of-Home screen.

Even sectors that until recently had not considered using LED video walls are increasingly turning to this solution: Corporations place them in their canteens, hotels use them to add glamour to their lobbies,

For large prestige projects like in airports, LED walls are currently the standard.

stage designers install them as backdrops, and visual artists create spectacular digital art utilizing the high luminosity and color intensity of LEDs.

The Triumph of LED

Before the hype around LED started, liquid crystal displays (LCD) were considered the leading screen technology. LEDs were mainly used in LCD monitors as energy-saving backlighting because liquid crystals, unlike LEDs, are not capable of converting electricity into light themselves. LCD monitors transmit each pixel as a gray unit, turned bright through an additional light source. Each color also needs a separate polarization filter.

In LED walls, on the other hand, the colored image is generated directly by the LED itself through layering of light. This gives LED screens a much higher brilliance compared to their liquid crystal competitors.

Despite these advantages, LED walls were not able to prevail against LCD displays for a long time. At best, they were used for digital signage displays in large outdoor areas – for example as large-format billboards in sports stadiums – where it is not the level of resolution that matters, but the highest possible brightness and thus, sunlight compatibility.

Only when it became possible to display precise, detailed images in high resolution, the triumph of LED screens began. With shorter viewing distances and shapeable display surfaces they became popular as a versatile medium for advertising and information. LED video walls are now installed as eye-catching elements in iconic sites, mounted over an outside edge or along a curved façade.

The Right Pixel Pitch

For the optimal effect, resolution and viewing distance must be matched. This is where the so-called pixel pitch comes into play, the distance from one pixel to the next. A single pixel corresponds to an LED cluster, made up of three LEDs in red, yellow, and blue. The cluster represents a pixel that can assume any color. The smaller the pixel pitch, the higher the image resolution.

The closer viewers are to the LED wall, the finer the resolution and the pixel pitch must be. The pixel should be small enough to no longer be recognized by the human eye as such. To determine the right pitch, the distance in meters is divided by a factor of 2 to 3, on average 2.5. For a distance of five meters, a pixel pitch of no more than 2.0 millimeters is recommended.

Available Space Determines Resolution

Resolution of LED walls is handled more cautiously in contrast to LCD and LFD which are always adapted to the 4K video content that is common today. After all, every single pixel is priced individually. Not only is the production of a single colored LED pixel comparatively expensive, but the price of video controllers also increases with the number of pixels to be processed. As a result, resolutions that are twice as fine usually cost four times as much for the same surface area. If unsure, a coarser resolution should be selected since the human eye is often unable to resolve finer pixel pitches anyway.

For LED walls, either the resolution is calculated to a video wall area, or the video wall assigned to the desired resolution. For example, for a “native” 4K video wall displaying a 4K advertising video in 16:9 format, at a viewing distance of five meters – with a pixel pitch of 2 millimeters – the video wall height should be 4.32 meters. However, these dimensions are not available in many rooms.

It makes more sense to choose the resolution based on the available space. For instance, a floor-to-ceiling video wall in 16:9 widescreen format installed in a 2.5-meter-high room requires a 4.44-meter-wide LED wall. At a viewing distance of 5 meters, this corresponds to a pixel pitch of 2 millimeters with a resolution of “only” 880 x 500 – not even Full HD. This resolution only makes sense for a viewing distance of 2 meters.

Brightness-Regulating Sensors

Since LEDs directly convert electricity to light, brightness increases proportionally to the current. To compensate for highly varying lighting conditions, and to save energy, LED displays usually have light sensors that can dim the provided brightness of up to 6,000 candela per square meter. When purchasing, customers should ensure that the image is always easily recogniz-

Displays with super fine pixel pitches are now often manufactured using so-called chip-on-board technology.

Photo: Concept International

able, even in very bright environments or in direct light – but also that viewers are not blinded by low ambient brightness and that no energy is wasted. Sustainability is also becoming an increasingly important criterion in the energy-hungry world of digital signage.

Variety of Sizes and Shapes

Large-format LED screens are made up of display modules. They are generally available in sizes of 25 x 25 centimeters and larger – or in the case of 16:9 LED modules from around 60 x 34 centimeters and larger, which corresponds to a diagonal of around 27 inches. Thanks to these individual modules, a wide variety of setups is possible. In addition to flat walls, surfaces can be curved inwards or outwards and into other special shapes, for example columns or spheres. The current limit are thin LED foils that can be bent with a radius of 7.5 centimeters and have a pixel pitch of about 1 millimeter.

Unlike large LCD walls, where the individual elements are separated by webs, LED modules fit together without gaps or frames. On these seamless LED screens, images and videos, even on very large surfaces, appear as if cast from a single mold.

For mounting, LED video walls usually require a depth of two to ten centimeters.

Moisture-Resistant Outdoor LEDs

Waterproof LED video walls resistant to moisture and temperature fluctuations are now on the market for outdoor applications. Electronics, power supply, and cables are encapsulated. The individual LED modules can be mounted in a hanging position.

The Installation of thes modules is relatively simple: First, lightweight lattice frames are clipped together, then in the second step planked with the LED tiles either from the front or from behind. The tiles snap into place magnetically. Assembly and disassembly is particularly fast with this mounting system.

COB LED Displays: Almost Like LCD

Displays with a very fine pixel pitch of 0.5 to 2 millimeters are now often manufactured using so-called “chip on board” (COB) technology. Unlike SMD technology, the LEDs are completely encapsulated in a substrate. This gives them much more stability and a continuous front surface, just like LCD displays. They can be wiped clean and are mechanically insensitive. The demand for these COB LEDs is increasing steadily, especially in exposed store fitting and in the highly exclusive home cinema sector.

Procurement Becomes Easier

Despite their undeniable technical and visual advantages, IT system integrators still shy away from selling LED walls. Traditional procurement at the square meter level is complex, as redundancies and aging processes must also be factored into the desired runtime. Warranties and maintenance offers, like in the LCD market, are rare. IT system integrators are more accustomed to procuring at unit level and thus offering complete solutions with warranty extension packages.

Now, as the demand for large-format LED screens is growing, the first distributors are moving to simplify module procurement for LED walls. They are offering displays on a per-unit basis, including a two- to five-year on-site warranty. Faults are fixed remotely or on-site by the manufacturer. System integrators do not have to worry about technical details such as aging, brightness and color calibration, power supply, signal redundancies, or video controller technology.

Slowly, complete packages are also becoming available on the market. For example, when buying a 16:9 full HD wall in 370 x 200 centimeters with 1.5 millimeters pixel pitch the package can include all the necessary individual parts, such as trolleys, power cables, video controller, or touchscreen. Before operation, only the electrical and – for hanging solutions – the static conditions need to be checked.

Renting or hire-purchase is also becoming increasingly popular. When renting a fixed monthly installment, maintenance and everything else is included.

LED Is On The Way to Dominate

Despite still existing barriers to procurement and maintenance, it is clear that LED walls will soon be the dominating visualization technology in digital signage. According to forecasts of Futuresource Consulting, the LED sector will grow 30 percent year-over-year in 2022, representing revenue beyond the USD-8-billion mark. The industry could receive further impetus from new LED technologies such as the aforementioned bending foils, making it realistic to exceed the USD-15-billion sales mark as early as 2025.

About the Writer

As Business Development Manager at Concept International, Susanne Gomez is responsible for expanding the volume business. Prior to that, she supervised digital signage and airport solutions for 15 years at Inonet as Key Account Manager.

Read the story behind
this picture on page 100.

DOOH

Photo: Adrenorama

GERMAN MARKET

Out-of-Home is Fully Recharged

Numbers like in 2019: The German DooH market did not only weather the Covid-19 storm, but created the basis for more growth in the rest of 2022.

Balthasar Mayer

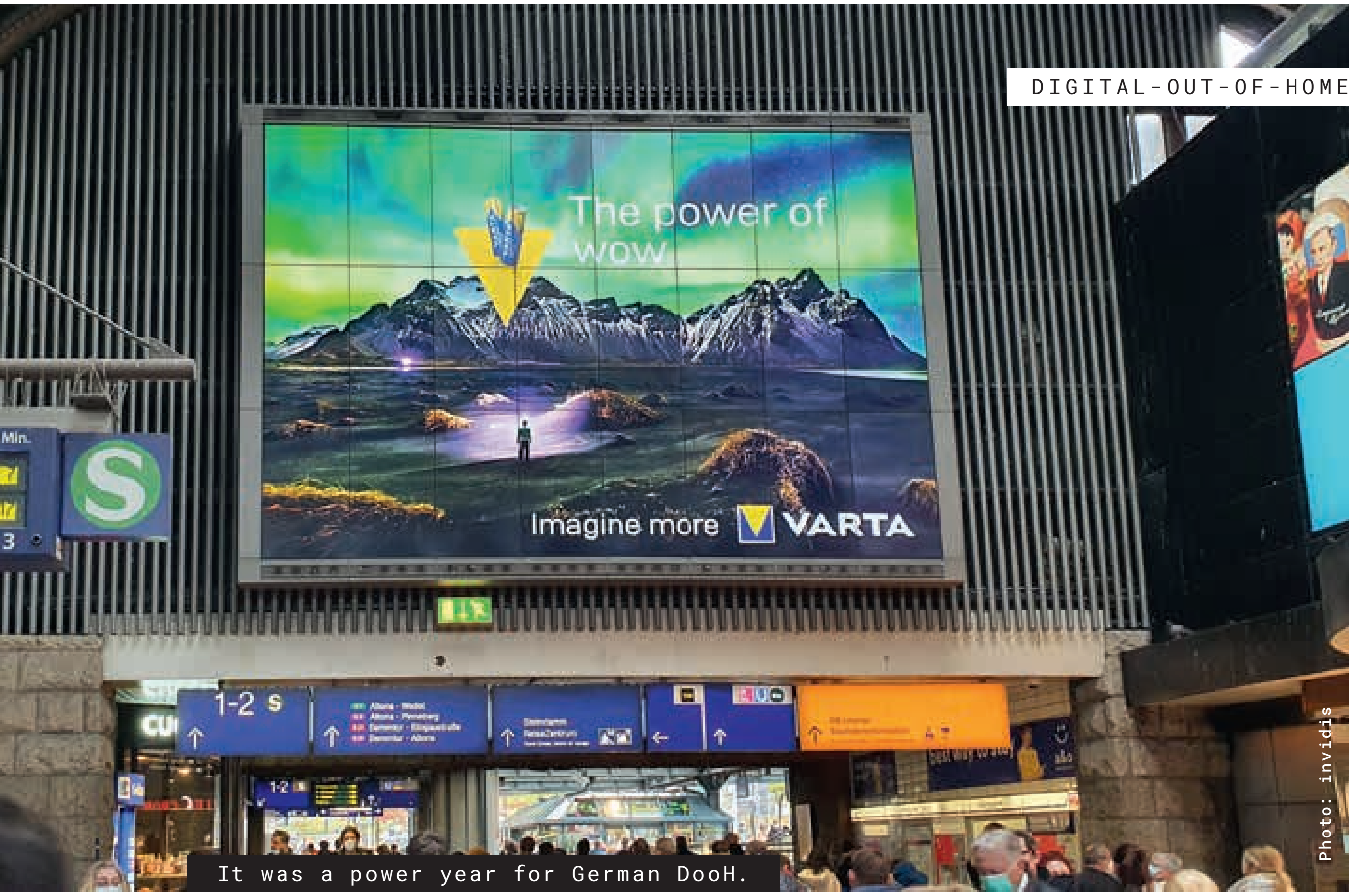
The last 12 months were good ones for DooH in the German Market: The current Nielsen advertising trend (Spring 2022) reports that in 2021, Digital-out-of-Home generated gross advertising revenues of 933 million Euros. This represents an increase of 22.2 per cent compared to 2020 (763.98 million Euros) and almost 25 percent compared to 2019 (747.12 million Euros).

DooH once again proved to be the growth driver of the out-of-home genre: it is true that OoH as a whole increased by 11.1 per cent (+256,26 million Euros) in 2021 compared to the previous year, despite various Corona-related restrictions in public life. But two-thirds of this growth can be attributed to digital screens in public spaces (+169.49 million Euros).

After losses in the first Corona year, especially in ambient DooH, all digital-out-of-home segments were among the winners in 2021. With +9.7 percent (+47.86 million Euros) compared to 2020, digital transport media (at railway stations, motorways, airports and public transport) even exceeded the strong sales of 2019 (+5.8 percent). At-Retail DooH – screens at the point of sale – was already up in 2020 compared to pre-pandemic levels. With 16.3 percent (23.83 million Euros) above the previous year, the trend continued in 2021. Digital billboard was already up by more than a

Energy consumption will be a talking point, and not only in the creatives.

Photo: invidis



It was a power year for German DooH.

Photo: invidis

quarter in 2020 compared to 2019, to reach a plus of 71.4 per cent (+786.9 million euros) in 2021. And ambient DooH, which had still lost massively in 2020 (-73 percent), went completely through the roof in 2021 with an increase of +703 per cent – albeit in absolute figures at a comparatively low level (from 1.55 million Euros in 2020 to 12.44 million Euros in 2021).

2022 off to a Promising Start

DooH 2022 also got off to a strong start: in the traditionally weaker advertising month of January, the category grew by 74 per cent (+27.59 million Euros) year-on-year. Digital screens achieved a market share of 40 percent within outdoor advertising.

Of course, the boom was also and especially felt by the big players in the industry. In the first quarter of 2022, German market leader Ströer generated sales of 385 million Euros – the highest first quarter in the in the history of the company. With +55 percent, out-of-home sales developed particularly positively.

Worldwide OoH giant JC Decaux's consolidated revenues grew in 2021 by +18.7 percent to 2.74 billion Euros, driven by very strong DooH growth and a better-than-expected fourth quarter (+37.5 percent). Europe, including France and the United Kingdom, achieved a revenue almost on pre-crisis levels, whereas the other regions of the world recorded a strong upswing compared to 2020.

Concepts for the Future

The growth and the good forecasts also have to do with the megatrend of programmatic advertising. It has been on everyone's lips for some time and now more and more networks are actually being connected programmatically. Experts attest to the potential of programmatic, that DooH, and with it OoH, will continue to grow and live up to the label of "the last mass medium" *(see articles on pages 142 and 144)*.

Thus, DooH has a good starting position for the coming months and years. And this is important, because major tasks are on the horizon. The digitalization of cities is one central aspect, and DooH can play an active role in this – if, among other things, reservations about advertising in public spaces are addressed. This also includes DooH positioning itself on the subject of the "Green City". Not only through greening of street furniture, but also by openly dealing with its own CO2 emissions. The emerging energy crisis in particular is raising questions in public, for example about the power consumption of digital screens. Here, the industry must come up with plausible answers and convincing concepts.

Airport

	SCREENS	SALES
Airport Bremen	14	Bremen Airport
Airport Channel Classic	753	BCN
Airport Berlin	58	Berlin Airport
Airport Channel Düsseldorf	124	BCN
Airport Channel Hamburg	94	BCN
Airport Channel Hannover	100	BCN
Airport Channel München	202	BCN
Airport Channel Nürnberg	41	BCN
Airport Channel Stuttgart	110	STR, BCN
Airport Channel Dresden	13	DRS, BCN
Airport Channel Dortmund	24	BCN
Airport Channel Münster/Osnabrück	15	BCN
Airport Channel Köln/Bonn	30	CGN, BCN
Aiport Düsseldorf	410	DUS Airport Media, BCN, WallDecaux, Ströer
Airport Hamburg	16	Hamburg Airport Media
Airport Frankfurt	1.243	Media Frankfurt
Airport Leipzig/Halle	16	Flughafen Leipzig/Halle
Airport Dresden	20	Flughafen Dresden
Airport Munich	215	Flughafen München
Airport Nürnberg	3	WallDecaux
Premium Airboards (Köln/Bonn, Paderborn)	37	Goldbach
DoorShow - Airport	11	Goldbach
Total	**2.797**	

Passenger TV

	SCREENS	SALES
Berliner Fenster	3.200	mc R&D
Münchner Fenster	2.648	mc R&D
Fahrgast TV (various cities)	5.993	various
X-City Hannover Fahrgastfernsehen Flotte	864	X-City Marketing
Public Video Train Hamburg S	2.328	Ströer
Public Video Train Hamburg U	1.908	Ströer
Public Video Train München S	3.808	Ströer
Total	**20.749**	

Train Station

	SCREENS	SALES
Public Video Infoscreen	1.444	Ströer
Public Video Station	3.588	Ströer
Super Motion	16	Ströer
X-City Hannover Station	33	X-City Marketing
Digitale Postergalerie	12	WallDecaux
CityNet Bochum	34	Goldbach
Digital Underground	74	WallDecaux
Total	**5.201**	

Motorway

Motorway	SCREENS	SALES
Autobahn Channel Classic, DCLP, Travelboards	3.400	BCN
Mobility Channel	660	Goldbach
Autobahn Channel - Sanifair	1.000	BCN
Total	**5.060**	

Taxi

Taxi	SCREENS	SALES
Taxi-Ad	300	Taxi-Ad
Total	**300**	

Outdoor

Outdoor	SCREENS	SALES
Digitale City Light Boards	47	WallDecaux
DigitalCityNet - Berlin	256	WallDecaux
DigitalCityNet - Hamburg	107	WallDecaux
DigitalDeluxeNet - Dortmund	10	WallDecaux
DigitalDeluxeNet - Düsseldorf	30	WallDecaux
DigitalDeluxeNet - Hamburg	50	WallDecaux
DigitalDeluxeNet - Berlin	50	WallDecaux
DigitalDeluxeNet - Köln	37	WallDecaux
DigitalDeluxeNet - Mannheim	14	WallDecaux
DigitalDeluxeNet - Bremen	20	WallDecaux
DigitalDeluxeNet - München	262	WallDecaux
DigitalDeluxeNet - Wiesbaden	10	WallDecaux
Videoboards Germany	340	Videoboards Germany
Eyescreens Videoboards	27	Eyescreens
ADXXL Videoscreen Berlin Kurfürstendamm	1	AF-FIX
Roadside Channel	116	Goldbach
Public Video Giant	14	Ströer (blow-up Media)
Public Video Roadside	1.000	Ströer
Public Video City	5	Ströer
sonnenklar.TV Reisebüros	388	Framen
TVG Reisebüros	91	Framen
DER Reisebüros	22	Framen
Hygh City Netzwerk	751	Hygh
Hygh Premium Netzwerk	130	Hygh
Digitale CLP Roadside & LEH	660	Inovisco
Regio.news	36	Shipleys GmbH
Various Single Site LED	54	various
Videowalls Berlin Mercedes Platz	21	Goldbach
DCLPs Berlin Mercedes Platz	38	Goldbach
Total	**4.587**	

Note: All figures are based on reports from companies or on estimates by an advidory board
Sources: invidis consulting GmbH, company informations, DMI/IDOOH; as of June 2022

Parking

	SCREENS	SALES
Doorshow- Parkhaus	8	Goldbach
Parkhäuser Rainbow-Parking	10	Goldbach
Total	**18**	

Shopping Center

	SCREENS	SALES
Cittadino Mall Channel	300	BCN
Mall Channel	750	Goldbach
DoorShow Mall	34	Goldbach
EKZ Buchen/Odw. Stele	2	pixility
EKZ Buchen/Odw. Aufzüge	2	pixility
Public Video Mall	2.215	Ströer
Total	**3.303**	

Retail (POS)

	SCREENS	SALES
Media Markt-TV	19.840	EAM
Saturn-TV	12.240	EAM
MEDIMAX-TV	7.210	EAM
real.- ShopKontakt	1.076	echion
Food Channel (EDEKA Nord & Süd)	3.894	neo advertising
EDEKA TV	2.200	Brandlogistics
Travel Impuls TV	60	Brandlogistics
Check Out Impuls TV	1.500	Brandlogistics
Theken TV	2.200	Brandlogistics
REWE TV	3.900	Brandlogistics
Laden TV	7.100	Brandlogistics
Wasgau	3	Shipleys GmbH
Getränke TV	119	Brandlogistics
LEH Channel - Getränke	119	Goldbach
Travel POS Channel (SPAR-Express; Press&Books)	179	Goldbach
Travel Press & Books Channel	107	Goldbach
Special POS Channel	67	Goldbach
Stilwerk	6	Framen
DOOH POS Indoor	140	Metaposter
Hygh POS Netzwerk	625	Hygh
Digooh	700	Digooh
DooH.eu	4.211	DooH.eu, heineking
Total	**67.496**	

Entertainment & Leisure	SCREENS	SALES
Cinema TV	565	EAM
Cinema Channel	200	Ströer / EAM
McFIT	1.698	EL CARTEL
Active-TV	2.195	EAM
DOOH Fitness	16	Metaposter
DOOH Fitnessstudios	2.551	airtango
DOOH Bäder	10	Deutsche Hochschulwerbung
Hotel Channel	109	Goldbach
McDonald´s-TV	1.084	EAM
King Channel	1.136	Goldbach
Leonardo Hotels	136	Framen
Steigenberger & Marriott Hotels	126	Framen
Hairstyling-TV	534	EAM
sport-info.tv	6	First Screens Digital Media
Edgar Art Screen	1.000	Edgar Media Group
Total	**11.366**	

Education, Workplace & Services	SCREENS	SALES
Digitales Schwarzes Brett	8.500	heineking / Verner&Friends
stadt-info.tv	17	First Screens Digital Media
DOOH Hochschulen	471	Deutsche Hochschulwerbung
Unicum-TV	350	Unicum
Campus-TV	301	EAM
ExecutiveChannelNetwork (ECN)	263	ECN
WeWork	118	Framen
Berliner Ämter - WarteTV	174	CMS
Total	**10.194**	

Healthcare	SCREENS	SALES
TV-Wartezimmer	6.009	TV-Wartezimmer
docspot.tv net	64	First Screens
Vetiprax TV	429	Vetiprax
Apotheken Terminals	276	Markenkonstrukt
Apotheken TV	1.215	EAM
Apotheken Channel (APOVID)	2.000	SK2
Total	**9.993**	
Total DE	**136.004**	

Note: All figures are based on reports from companies or on estimates by an advidory board
Sources: invidis consulting GmbH, company informations, DMI/IDOOH; as of June 2022

Austria

Airport

	SCREENS	SALES
VIE Digitale Werbung Gepäckbänder	144	Vienna Airport
VIE LED Walls	6	Vienna Airport
Total	**150**	

Education, Workplace & Services

	SCREENS	SALES
Public Building	24	Goldbach AT
School	89	Goldbach AT
University	74	Goldbach AT
Lift	135	Goldbach AT
Total	**322**	

Healthcare

	SCREENS	SALES
Y-Doc	2.200	Y-Doc
Total	**2.200**	

Outdoor

	SCREENS	SALES
DooH Outdoor Wien	66	Gewista
Salzburg Deluxe	19	Gewista
Graz Deluxe	16	Gewista
Linz Deluxe	30	Gewista
Klagenfurt Deluxe	8	Gewista
Bregenz Deluxe	4	Gewista
Innsbruck Deluxe	5	Gewista
St. Pölten Deluxe	2	Gewista
Wels	8	Gewista
City	134	Goldbach AT
Roadside	171	Goldbach AT
Roadside	700	Monitorwerbung
Total	**1.163**	

Austria

Passenger TV

	SCREENS	SALES
Infoscreen	3.507	Infoscreen
Bus	100	Goldbach AT
Total	**3.607**	

Retail (POS)

	SCREENS	SALES
Fachmarkt	7.127	Goldbach AT
Total	**7.127**	

Shopping Center

	SCREENS	SALES
Transport Wien	39	Gewista
DooH Outdoor Wien	29	Gewista
Railscreen Mall	31	ÖBB Werbung
Shopping Mall	331	Goldbach AT
Total	**430**	

Train Station

	SCREENS	SALES
Transport Wien	89	Gewista
Escalator Lights Wien	262	Gewista
Railscreen Station	105	ÖBB Werbung/Goldbach AT
Railscreen Classic	9	ÖBB Werbung
Total	**465**	
Total Austria	**15.464**	

Note: All figures are based on reports from companies or on estimates by an advidory board
Sources: invidis consulting GmbH, company informations, DMI/IDOOH; as of June 2022

Switzerland

Airport

Airport	SCREENS	SALES
Geneva Digital Network	36	Neo Advertising (Goldbach)
Geneva Digital Iconic	5	Neo Advertising (Goldbach)
Geneva Digital Parking	5	Neo Advertising (Goldbach)
Digital Airport	161	Neo Advertising (Goldbach)
Zurich Airport Screen BaggageClaim	34	APG
Zurich Airport eBoard BaggageClaimXX	32	APG
Zurich Airport ePanel FlightInformation	98	APG
Zurich Airport ePanel AdWalk	27	APG
Zurich Airport eBoard	5	APG
Basel Digital Network	7	Clear Channel
Total	**410**	

Exhibition

Exhibition	SCREENS	SALES
Palexpo Geneva	50	Neo Advertising (Goldbach)
Total	**50**	

Outdoor

Outdoor	SCREENS	SALES
City Geneve	18	Neo Advertising (Goldbach)
City Zurich	245	Neo Advertising (Goldbach)
Cityscreens	245	Livesystems (Schweizer Post)
Zurich Bahnhofsstrasse	16	Clear Channel
Digital Street Switzerland	160	Clear Channel
Total	**684**	

Switzerland

Passenger TV

	SCREENS	SALES
Digital Public Transport	616	Neo Adervertising (Goldbach)
Public Transport	5.600	Livesystems (Schweizer Post)
Total	**6.216**	

Retail (POS)

	SCREENS	SALES
Coop Pronto	320	Neo Advertising (Goldbach)
Canal Poste	550	Livesystems (Schweizer Post)
Gas Stations	2.000	Livesystems (Schweizer Post)
Migrolino	800	Livesystems (Schweizer Post)
Digital Convenience Network Coop Pronto	221	Clear Channel
Total	**3.891**	

Shopping Center

	SCREENS	SALES
Digital Shopping	460	Neo Advertising (Goldbach)
Digital Branding	13	Neo Advertising (Goldbach)
Shopping Malls DooH	121	Clear Channel
Total	**594**	

Train Station

	SCREENS	SALES
ePanels /eBoards	1.000	APG
Bus / Mountain	1.500	APG
Total	**2.500**	
Total Switzerland	**14.345**	

Note: All figures are based on reports from companies or on estimates by an advidory board
Sources: invidis consulting GmbH, company informations, DMI/IDOOH; as of June 2022

DooH is becoming available for programmatic – recently, for example, the Clear Channel network in Switzerland by the One Tech Group.

Photo: One Tech Group

PROGRAMMATIC

Off to New Shores

Programmatic is considered the driving force of growth in the Digital-out-of-Home market – mainly thanks to its potential in unlocking new budgets for digital outdoor advertising.

Balthasar Mayer

Programmatic is one of the most important topics of the DooH year 2021/2022. Although the technology has been available for some time, its development and distribution has now clearly picked up speed. Especially the past year was an important one for programmatic outdoor advertising, as Kai-Marcus Thäsler, managing director of FAW, the German Out-of-Home Assocation, explains: “Programmatic has developed a face in the industry.”

There are different numbers of the exact share of programmatic in Digital-out-of-Home, but different sources put last year’s share at 20 to 30 percent. However, what everyone agrees on is that programmatic DooH will grow – and that significantly. “The programmatic share of individual DooH providers already accounted for 60 percent of their DooH revenues last year,” says Frank Goldberg, managing director of the Institute for Digital-out-of-Home Media (IDOOH). He assumes that programmatic advertising will amount to a share of 70 percent in the long term.

In line with this extremely positive forecast, programmatic is seen as a future driving force of growth; not only for DooH, but for the Out-of-Home market as a whole. “DooH is the only digital mass medium, which means it builds up a very large reach very quickly and can still be used for targeting and selection,” explains Frank Goldberg. Behind the buzzword programmatic advertising, he says, is the promise of being able to reach large audiences and to guarantee more accuracy, especially for smaller and flexibly deployed budgets – without a restricted use of resources in media planning.

Opening Up New Budgets

With these features, programmatic makes the DooH market more attractive and – and this is the crucial point – opens up new opportunities that could not be accessed before. “The advertising market has been going through a fundamental transformation for several years now that is still ongoing,” Frank Goldberg elaborates. “Classic, analog media are losing relevance, while digital media are gaining more.” For classic print media and TV, digitization is a threat. Online and mobile media are growing steadily but are no substitute for DooH because their strength lies in 1:1 targeting.

Programmatic advertising opens up the possibilities of targeting for DooH media which puts it in a good position to replace traditional reach media and benefit at least partially from loose budgets. Daniel Siegmund, founder and managing director of the digital signage technology provider One Tech Group, sees the access to budgets that had been out of reach for the market as a central aspect: “Markets have the chance to develop when essential processes are standardized. Media buying, control, and reporting are being transferred to programmatic in almost all relevant media channels.” And customers who rely on these automations also become open for digital-out-of-home. "As soon as a channel is widely available, the basic prerequisite for fresh money to flow into the DooH market is created,” explains Daniel Siegmund.

After establishing the technical basis, the next step now is to connect as many sites to programmatic as possible. The market is moving fast; not a month goes by without the announcement of more programmatic availability in DooH networks. While new agencies such as Framen or Hygh are facilitating access, agencies coming from the online sector are also bridging the gap between the two worlds.

This is precisely why programmatic will remain a growing market in the future: It gives DooH the chance to join other (online) channels on an equal footing. Outdoor advertising can be booked through an existing portfolio, in addition to online and mobile.

“If a company doesn't have a programmatic offer, it is about time do it now. Otherwise, they will miss out on an additional source of revenue,” says Kai-Marcus Thäsler.

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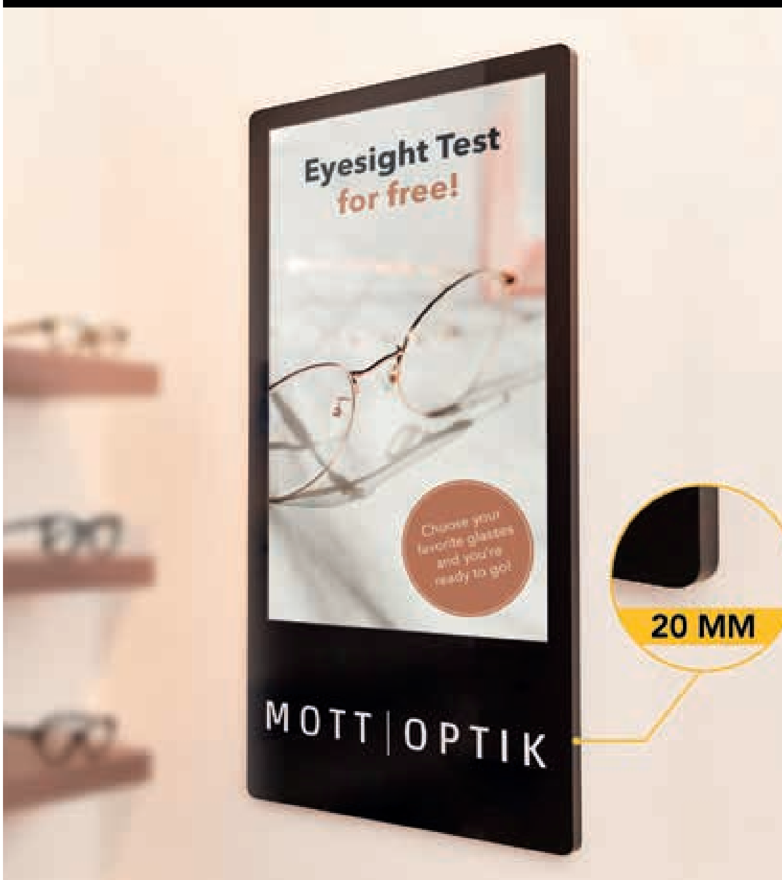

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PROGRAMMATIC

DooH it right

The technical potential of programmatic can only be reaped with suitable campaigns - and advertisers who trust in the technology.

Balthasar Mayer

Market figures and projections prove that the technological potential of programmatic DooH is huge. But not only the technology has to grow: Trust in the infrastructure must be gained along with it. "Technologically, we have lots of possibilities now. But at the same time, we also have to talk to advertisers and explain to them what programmatic can do," emphasizes Diederick Ubels, CEO and co-founder of DSP operator Sage + Archer. He is certain that the technology will only spread if use cases are successful. If the content is to be used for programmatic, it needs to be flexible and developed specifically to be compatible with external data.

As an example for a technologically sophisticated campaign of great depth, Diederick Ubels names a campaign Sage + Archer developed for the Dutch brewery Heineken. In April 2021, when outdoor bars reopened in the Netherlands after a long lockdown, the brewery ran a three-stage DooH campaign.

The Heineken campaign by Sage + Archer built upon the strengths of programmatic.

Photo: Sage + Archer

The first highlighted the opening of the bars with a countdown timer. The second encouraged people to visit a Heineken bar in immediate proximity of the DooH advertising medium and to send in photos of their first post-lockdown beer. The sent-in pictures were then incorporated into the third campaign.

In total, the motifs were played out by seven different network operators and marketers: in 150 locations, on 3,000 screens, with 100 different screen sizes, and in twelve different cities – all in proximity to a bar that was involved in the campaign. The submitted photos were also shown on screens next to the places where they were taken. For Diederick Ubels, the campaign was an ideal way to demonstrate the dynamic creativity of the Sage + Archer platform, the potential of its responsive HTML5 technology, and the power of location-based data usage.

What the example also shows is that the many possibilities programmatic opens up first have to be tested for applicability – for Heineken with a relatively small number of participating bars. And although the campaign involved individual customers with their submitted photos, Diederick Ubels sees this type of user-generated content as just one of the many options for using personal data. Whether and when the use of data is sensible, relevant, and purposeful, should be considered individually for each campaign.

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RETAIL MEDIA

DooH's new Darling

Walmart and Amazon are guiding the way: Online and in-store advertising is booming. But the rules of classic DooH cannot be applied to retail media.

Florian Rotberg

As a grocery store, Walmart became the largest retailer in the world. The company's total revenue in 2021 amounted USD 572 billion, more than e-commerce giant Amazon who generated USD 469 billion.

What is really surprising, however, are Walmart's revenues in retail media, which were reported individually for the first time: The company generated advertising revenues from trade marketing and brand marketing campaigns amounting to USD 2.1 billion – the equivalent of EUR 1.86 billion. By way of comparison, the world's largest out-of-home provider JC Decaux generated EUR 2.74 billion last year.

More and more, retailers are realizing the value of their platforms – both in-store and online. High customer frequency and the consumers' money-spending mindset are what makes POS advertising so attractive. Although Walmart's retail media revenue share is only 0.37 percent, the media business has extremely high margins in contrast to the sale of groceries.

Amazon has already helped retail media achieve a breakthrough in e-commerce: Their web store ads yielded a staggering USD 31 billion in 2021. This amounts to 6.6 percent of sales achieved through advertising.

The triumph of retail media in e-commerce cannot be contained. Since the pandemic, retailers have also been generating in-store-relevant revenues with trade and brand marketing for the first time. A market segment in which not only the leading DooH platform Broadsign is a successful operator, but also many retail tech start-ups.

Photo: Amazon

Amazon is a pioneer in online retail media. Will the company's digital affinity also help to transfer the concept to its physical stores?

In-house Expertise

One of those start-ups is Swiss analytics provider Advertima that uses AI solutions to optimize retail media in stores. The company picked up on the trend a year ago through a partnership with Posterscope UK. They consider this kind of technology an essential part of retail media. "Our hypothesis: unlike trade marketing budgets, brand marketing budgets need audience analytics and smart targeting to be directed to in-store," says Iman Nahvi, CEO of Advertima.

Walmart is a giant of retail media. In addition, the company now uses digital displays.

Photo: Marc A. Steele

These are the technical challenges that retailers first have to consider. In the end, they have two options: outsourcing the market rights to DooH network operators or retaining control by taking over marketing themselves. “Partnerships with network operators are not lucrative enough in terms of margins. Furthermore, they do not prioritize the network high enough over the rest of the inventory,” explains Iman Nahvi. This is where media salespeople are required who market the network exclusively – either in-house or commissioned exclusively through an agency.

The breakthrough of retail media on e-commerce platforms in the past few months has not only broadened the understanding for the business model. It has also convinced many retailers to summon experts into their own house.

The Advertima CEO explains: “The retail media departments that have been established internally for the online channels are able to call in the right experts who can push such a systematic restructuring.” He adds that in order for this change to happen, retailers need to reorganize the operation of their digital signage projects. They need to become the responsibility of the retail media departments, not of marketing, as has been the practice.

From the platform to the store

For Amazon, retail media will be key in the future: It plans to market its digital signage screens in its proprietary stores. The company is also reportedly considering expanding inventory marketing to other areas of the shopping experience in Amazon supermarkets, such as smart cart displays, self-checkout touchscreens and digital refrigerator doors.

For now, the DooH inventory is exclusively offered to brands who already deliver their products to Amazon and mark them with an ASIN number – Amazon’s standard identification number and the equivalent of SKI

Through its online business, Amazon knows how data and media metrics work. To extend that expertise to brick-and-mortar retail is only logical.

Using DooH to effectively reach consumers at the POS is essentially not a new idea. PRN already equipped Walmart stores with tube TVs 20 years ago. The problems were that business models did not work, and budgets were not there. But most of all: POS advertising was not sexy. For the first time, online has elevated the potential of retail media. The time of in-store retail media has come.

Photo: Matt Liu/Unsplash

The POS is highly sought after. (Symbolphoto)

RETAIL MEDIA

Who will dominate the POS?

Marketers consider programmatic DooH at the POS a goldmine. But retailers have other interests. Separate screen networks could pose a solution.

Florian Rotberg

Until now, it was simple: In-store digital signage promotes product sales, screens in public spaces create visibility for brands. The business models of promotion (below the line) and brand campaigns (above the line) rarely got in each other's way. But with the triumph of retail media, more and more DooH providers are pushing into the POS.

Since the outbreak of the pandemic, larger retailers have been courted by the industry more than ever. While DooH screens in city centers and train stations reached fewer consumers than before the crisis, supermarkets and drugstores continued to be highly frequented.

The business prospects for programmatic DooH campaigns at the POS are great. All the retailer has to do is make his screens available for marketing – with offers like these, DooH providers try to convince the high-frequency retailers. It is undisputed that programmatic campaign planning and playout is revolutionizing the DooH media genre. The available budgets are raised: from exclusively using out-of-home budgets to adjusting them on the basis of target groups and socio-economic characteristics.

Third Party Advertising – not Popular with Everyone

The new DooH windfall is not always met with open arms at the POS. Retailers are often reluctant to share their displays or their valuable store space so easily with third parties. For the retailers, product promotion is at the forefront. Campaigns are supposed to boost the sales of their own products and services. In-store goods are what should attract the customers' full attention. Simply placing additional screens in the stores has not been successful in the past. DooH screens in gas stations have demonstrated this failure for several years. In the rush to optimize sales, gas station operators allowed up to seven different network operators to install displays around the checkout area. The screens that varied randomly in size and shape stole each other's show. The consumer was overwhelmed at the checkout by simultaneous tobacco, car wash and bistro campaigns – all below-the-line product ads – and campaigns for Lotto, TV shows or automotive brands from external DooH network operators.

Every single screen and every single campaign was programmed for the target audience and the POS. But the consumer was overstimulated by the amount of digital content.

Even though the multi-display gas station scenario no longer exists, the conflict remains. Today, DooH marketers increasingly push towards in-store screens to sell part of their content inventory with above-the-line programmatic ads.

Separation could work

Retail Media DooH alongside promotion campaigns – can it work? From the DOOH marketer's perspective, the answer is clear: frequency, Opportunity to See, mindset – everything aligns. But from the retailer's point of view, the mixed operation of promotion and retail media is not without its challenges. The own messaging gets diluted, campaign management using blacklists and whitelists is complex and often a dynamic process. And why should the retailer share valuable POS space with outsiders?

Tank und Rast has guided the way: Their own display network at the POS is primarily designed to optimize sales and WKZ. Third-party marketing runs on separate screens, but under the full control of the retailer. Control over all activities on the sales floor can therefore be retained.

Times change, as do business models. It may well make sense for retailers to unlock parts of the content loop for above-the-line campaigns via third-party marketers. But generally, mixed operation does not function without friction. A better option is to have clearly separated networks distributed throughout the store along the customer journey. In other words, being resolute like a "no dog" sign and declaring "Dear marketers, you have to stay outside."

Programmatic is more expensive

Benjamin Wey, CEO of Adtrac, sees great potential for Programmatic Retail Media. With his white-label marketplace solution Adtrac Indy, the company enables retailers to transform their digital signage screens into a profitable media inventory. The software handles the processing, tracking, and reporting of the campaigns and transfers the billing data to the provider's financial tool.

In third-party marketing, another factor has to be considered, which Benjamin Wey points out: costs. The media market operates with revenue sharing. With the use of programmatic, the value chain becomes even longer.

An example: A beverage producer books media services on a retailer's screens for 100,000 Euros. Since he acts through his media agency, he first has to pay the agency costs – for example 5,000 Euros. In total, the producer will have to pay 105,000 Euros.

The agency books the campaign through a DSP. The DSP's revenue share is usually between 10 and 20 percent of the order. The SSP takes another 10 to 20 percent revenue share. "Behind all that is a marketer with exclusive rights who takes a reward of 25 percent on his sales," adds Benjamin Wey.

In the end, the retailer receives 61 percent of the 105,000 euros. If the retailer had directly negotiated with the beverage producer, the entire amount would have been at his disposal.

NEW DOOH ASSOCIATION

The Goal is a Common Currency

Frank Goldberg, Managing Director of the newly founded IDOOH Institute, explains how the institution wants to launch common performance metrics for digital-out-of-home.

Balthasar Mayer

The German DooH industry has a new association: the Institute for Digital Out of Home Media – IDOOH for short – was launched at the beginning of 2022. Technically speaking is IDOOH not an association but a private company founded by the Digital Media Institute (DMI) – an initiative supported by almost all DooH media owners in Europe's largest advertising market, sales house Goldbach Germany and Germany's largest Out-of-Home media owner Ströer. The new company aims to strengthen the DooH market and support its further development.

The IDOOH managing directors Nadia Abou-El-Ela and Frank Goldberg are already known to the industry in the same role at the DMI. invidis spoke with Frank Goldberg about IDOOH's role in the industry and the opportunities for joint growth.

invidis: Mr Goldberg, Germany has already Out-of- Home associations like the FAW. What role will IDOOH play?

Frank Goldberg: Thanks to programmatic advertising, Digital-out-of-Home has been able to open up completely new opportunities for advertisers in Out-of-Home advertising over the past four years. In addition, the vast majority of all DooH advertising media are found in environments that do not correspond to those of classic outdoor advertising and thus require their own metrics. In short: Digital-out-of-Home requires special, dedicated attention. The development of advertising products and standards, the collection of performance metrics and proof of impact as well as generic media marketing: IDOOH does all of this and will work constructively with FAW to do so.

A declared goal of IDOOH is a joint indoor and outdoor DooH audience study. The market has with ma Out of Home already an established research. Is this not enough?

Since ma Out of Home concentrates primarily on the classic outdoor advertising environments – roadside, public outdoor areas on streets and in pedestrian zones – it does not represent the entirety of all DooH environments. Therefore, in addition to ma Out of Home, the studies Public Video by Ströer and Public & Private Screens by DMI have existed for some time. The latter will be replaced in the future by a common dedicated DooH performance metrics study published by IDOOH. That is the goal: a common and uniform metric research of all DooH media in a joint study.

What exactly will this look like?

The new exposure study will not apply completely different methodological principles than previous studies in the market. However, we will fully rely on modern mobility metrics: Instead of conducting representative mobility surveys in the form of interviews – as has long been customary – we will rely heavily on geo-tracking. For this purpose, both representative, controlled market research panels and anonymised mass data from millions of smartphones as well as sensor technology will be used. This gives us the opportunity to describe the mobility of our target groups in very good spatial and temporal resolution and to offer high-frequency updates of our performance records.

What new insights do you hope to gain?

First of all, we do not expect the levels of the previous exposure and contact measurements to change significantly in the long-term average. The previous surveys were already elaborate and of high enough quality for that. However, we will be able to provide much more details in terms of spatial and temporal resolution of the data: With technically continuously measured performance values per individual location, down to the individual hour of a day, we will be able to provide the urgently needed "fuel" for programmatic advertising and thus for further dynamic growth of the market.

IDOOH was founded by the DMI together with Ströer and Goldbach. At the same time, you emphasise that the initiative is open to the entire industry. How difficult is it to get the fragmented industry around one table?

These are the usual challenges for an association: Why and on which topics should companies that are in competition work together? Usually it is a matter of convincing competitors that common standards and a common public image bring advantages for all. In IDOOH, this is easier for us than usual because the DooH category has been growing for years and there is an opportunity to accelerate this growth even further through joint coverage surveys, technical standards and joint category marketing.

Does this also apply to smaller market players?

In a growing market, everyone benefits: the big ones, because much of the growth reaches them due to their high market share, and the small ones, because they not only simply grow with the market, but usually even disproportionately. This is especially true for our market, because programmatic will improve access to customers and budgets, especially for the small providers.

Frank Goldberg is co-managing director of IDOOH.

How will you go about this?

We will introduce initiatives from which the market as a whole will benefit and pay attention to balancing the interests of all market participants. We will ensure an intensive exchange within the industry and for this we can fall back on the coordination formats that we have already developed with the DMI in the past years: Conferences, working groups and expert working groups. And we will communicate our initiatives, their progress and their results transparently both within the circle of IDOOH and DMI members and to the industry as a whole. Because association work is only successful when the association has the trust of its members and the industry.

As of June 2022, can you already officially welcome other major market players as members?

Not yet, but talks are underway.

What will happen with the DMI after the founding of IDOOH? There is some overlap in the fields of activity.

The DMI will remain as the founding partner of IDOOH. As in the past, the DMI will be the association of medium-sized DooH providers as well as media agencies and ad-tech providers. The DMI will represent those in IDOOH. The DMI will hand over the media channel marketing of DooH to the IDOOH. This means that IDOOH will, for example, take over and further develop performance value measurement, media marketing with the DooH Creative Challenge, the development of standards and their coordination with the market as well as the implementation of industry events from the DMI.

In your communication you speak of a common currency for the DooH industry. What exactly is meant by this, which metrics are central?

As already mentioned: A common currency is first of all a uniform tracking of the performance values of all DooH media in a joint study. In this, we will continue to track the same metrics that have already been tracked by the existing studies; these are primarily advertising media contact volumes and reach as well as their distribution across time slots and the key demographics. These metrics are delivered at varying levels of granularity: From data for overall networks for strategic planning down to contacts per playout for programmatic targeting. A uniform currency is also a common accounting basis for the entire market. This requires transparency with regards to the collection method and the corresponding trust of the clients and their media agencies. To this end, IDOOH is striving to provide a generally accepted currency issued by a Joint Industry Committee.

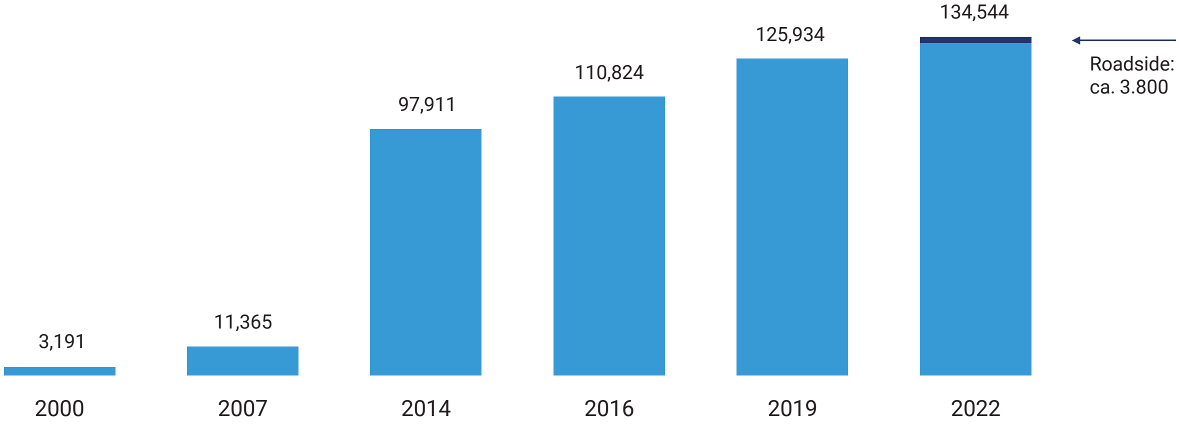
What are IDOOH's plans for the rest of 2022?

The immediate challenge is the preparation of the aforementioned comprehensive reach study – we will probably present this to the market in autumn 2022 – as well as the related discussions with the Joint Industry Committees.

Mobile IDOOH campaign

Photo: IDOOH

Total number of all DOOH screens
in Germany since 2000



Source: Survey of IDOOH

Outdoor advertising does not only include roadside screens.

Which topics will shape your work in the long term?

We have noticed that – despite the interest in DooH that has been growing strongly for years – the understanding of the media channel is not yet equally developed among all clients: It is a digital channel that offers many of the possibilities of online advertising – from flexible, short-term bookings via ad servers to data-based target group targeting. Above all, it is a media channel offering exceptional reach in the public space. This means that our targeting is 1:N and not 1:1; we can sometimes reach dozens – if not hundreds – of people at the same time with one advertising play-out. Thus, we can offer a large and fast coverage build-up. At the same time, we can enrich target groups through intelligent targeting and greatly reduce wastage. But we also have to explain all this to our customers. For this purpose, we will set up a variety of information and training offers.

And you are limited to the German market?

In the past years we have already invested some work in the development of standards and their coordination with the market. We will expand this in the future and also have to network more and more internationally. The big ad-tech networks in particular are present in many countries and are increasingly demanding uniform international standards.

IDOOH also organises conferences.

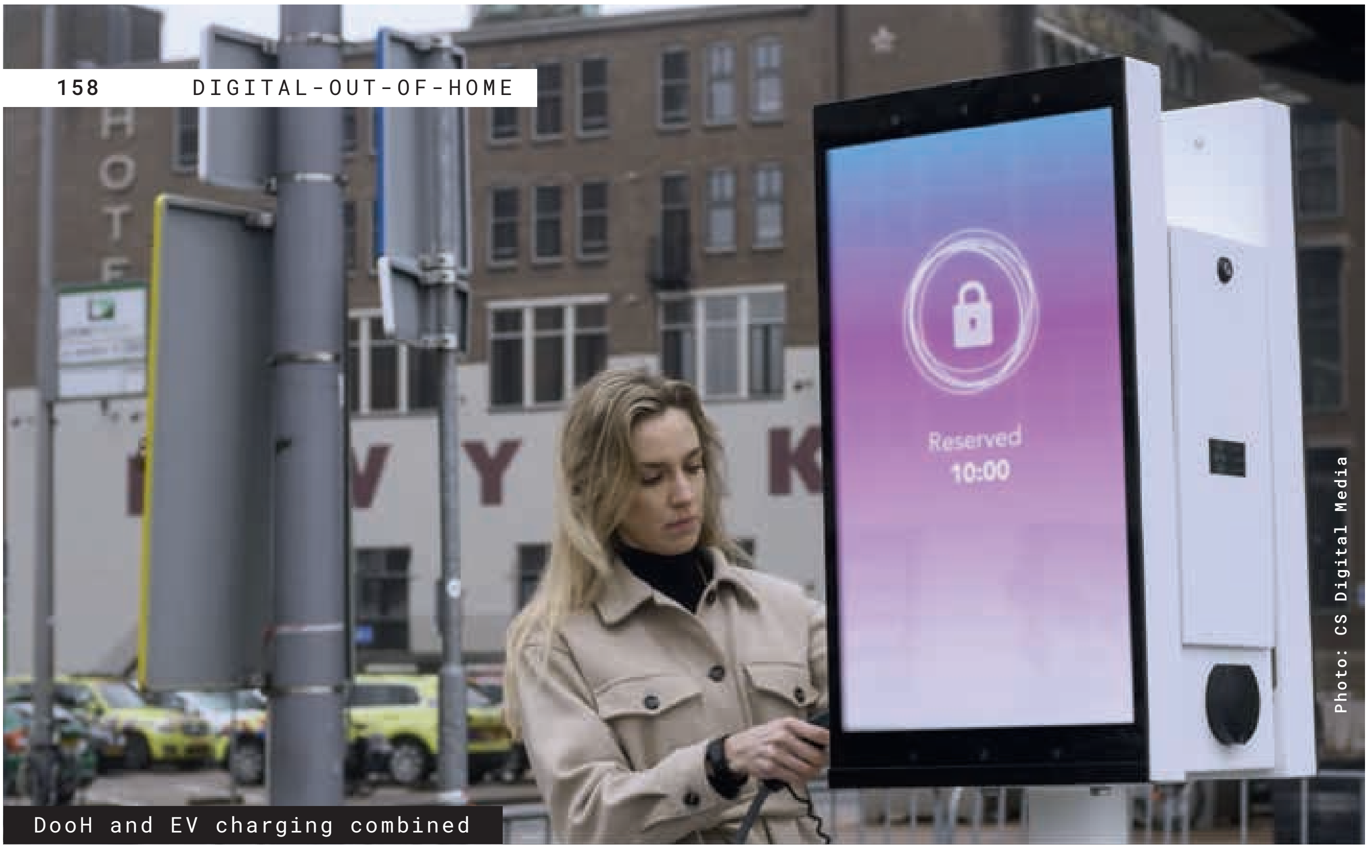


Photo: CS Digital Media

DooH and EV charging combined

AUTOMOTIVE ADVERTISING

DooH Meets EV Charging

With an integrated solution for electric vehicle charging stations, CS Digital Media is targeting EV drivers – with battery charging offers and advertising.

Florian Rotberg

Programmatic in DooH and other digital media has transformed the media business. Silos have been broken down and media budgets are flowing freely between media categories to reach the intended target group at the right time and location. Even if programmatic in media is still years away from becoming a standard – and media owners are keen on keeping a healthy flow of direct, dedicated budgets beyond programmatic – new models of programmatic are emerging. One of the most fascinating programmatic business models is currently developed and tested in the Netherlands.

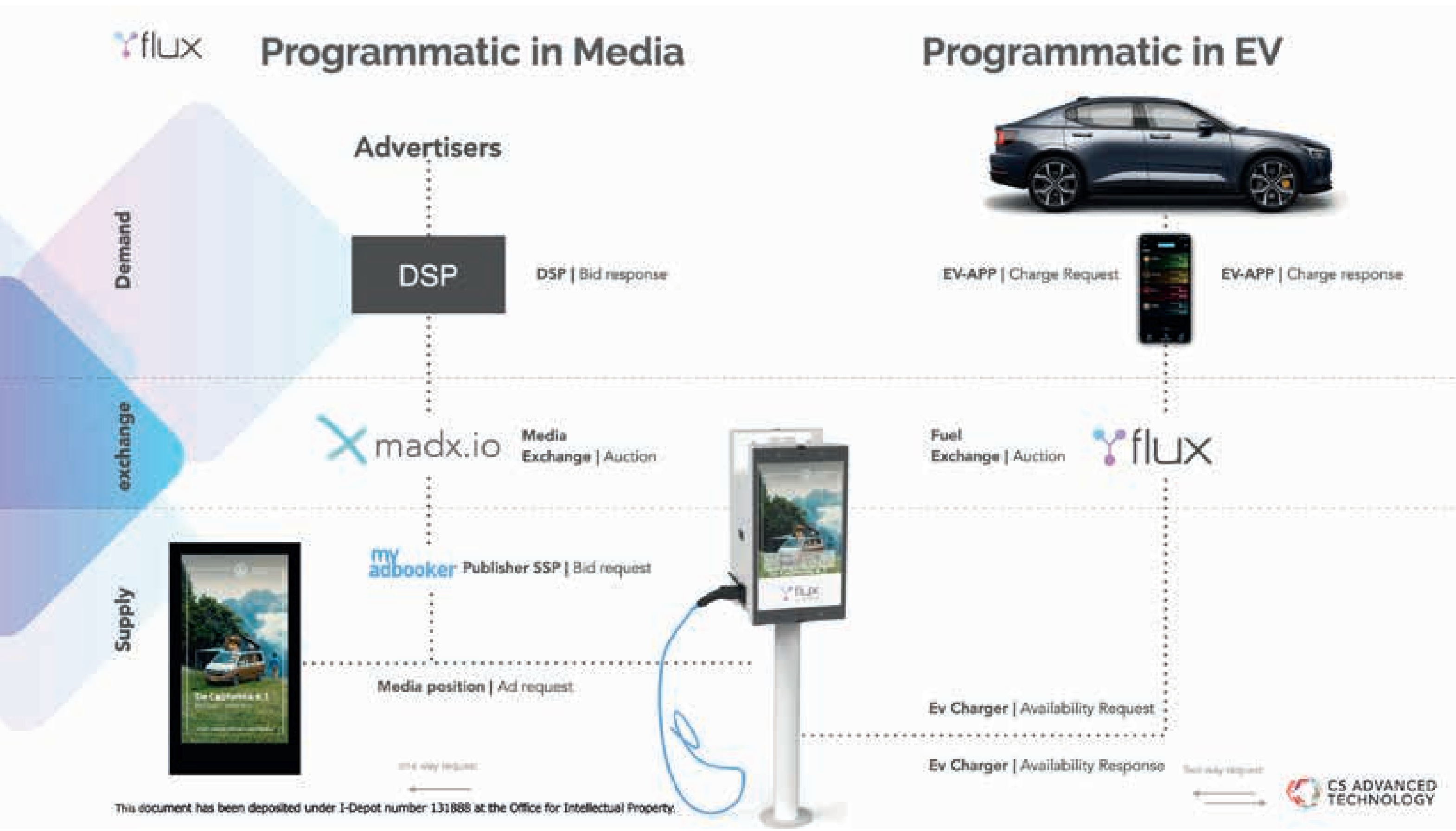
DooH pioneer Radjen van Wilsem, CEO of CS Digital Media in Amsterdam, is developing programmatic for EV Charging. CS Digital Media is known for forming bridges between DooH and automotive with innovative solutions. The first DooH solution scanned license plates at Dutch Shell stations, pulled publicly available information about brand, model, and age, and displayed a targeted ad on screens at the gas pump. Advertisers loved the opportunity to target drivers of competing brands at a moment of high dwell time.

Fast forward five years and CS Digital Media is back with an even more sophisticated DooH concept. The new programmatic solution Flux combines the best of DooH with EV charging. Flux generates traffic to Charge Point Operators by providing EV drivers with targeted offers. In close proximity, retailers with charging points will be able to target specific EV-models and drivers with a certain battery status or known shopping behavior with cheaper or free battery charging offers for a dedicated time slot. Once on-site, double monetization is made available on screens at the charging point, using user data and programmatic advertising technology to activate high value advertising on the screens.

At first, communication and targeting will function via the mobile app Helloyou. In the future, interaction is planned to run directly through the built-in vehicle screens. CS Digital Media developed a fully working solution including the energy exchange Flux, the media exchange My-Adbooker, and the digital signage CMS Quantumloop – all based on Tizen and 13" - 98" Samsung screens.

The Dutch DooH market leader could disrupt the way public EV charging is offered. Today still a painful, detached process with numerous incompatible charging point operators and charging card systems could become frictionless and cheaper for EV drivers and fully addressable for advertisers. Retailers and brands would only target but lead the target group directly to the point of sale for a direct conversion.

In addition, programmatic would enable dynamic pricing and new commercial business models to EV charging. The new Flux platform is already being tested in the Netherlands and ready for roll-out in 2023.



Source: CS Digital Media

CS Digital Media wants to combine EV charging and DooH.

VOLTA

DooH Charging Pioneer On The Rise

The DooH network operator Volta is considered the pioneer in marketing the advertising of EV charging totems. Media sales in North America have been moderately successful so far. Still, Volta management expects a positive business development.

Florian Rotberg

DooH displays in charging stations for electric vehicles were once seen as a great opportunity to partially refinance EV charging infrastructure at the roadside. However, it quickly became apparent that the best locations for charging stations usually do not offer sufficient range for DooH sales, and that vehicles obstruct the view of screens. All major energy suppliers played with the idea of combining DooH and EV charging infrastructure, but the market analyses were disappointing.

One of the providers that refused to be dissuaded was US-based Volta. In a first phase of expansion, Volta placed charging stations in car parks at the entrances of Whole Food supermarkets and shopping centers. With free charging for customers, retailers had hoped to attract affluent, early adopters of EV as customers. DooH advertising on the screens was an extra income, but not even remotely covered the costs.

Volta installed over 1,000 charging stations with screens in many major metropolitan areas in the US. The most important advertisers were EV car manufacturers.

Largest EV-DooH Network

Today, Volta operates a network of nearly 2,500 charging stations with 4,700 55" screens, including more and more fast-charging stations that are especially attractive to EV users and enable a higher frequency of users. Since the pandemic, Volta has focused its media sales on 8- and 15-second spots for FMCG advertisers rather than just car manufacturers. This has also increased advertising revenue per screen to USD 434. Since its IPO, Volta is obliged to publish business figures, which provide an interesting insight into the business development.

In the first quarter of 2022 for example, Volta was able to increase revenue by 77 percent compared to the pandemic quarter of the previous year. However, at USD 8.4 million, the turnover is still marginable. For the full year 2022, Volta expects a turnover of USD 70-80 million, of which 73 percent of the revenue should come from DooH media sales.

No Sustainable Business Model Yet

The DooH-EV pioneer still has a long way to operating a profitable business. For example, Volta posted an EBITDA result of -43 million USD in the first quarter of 2022. The financial figures (USD 8 million revenue vs USD 42 million loss) make it clear that Volta is still far from a sustainable business model. The monthly advertising revenue per screen was USD 434 which corresponds to a utilization of 25 percent at an industry-standard CPM of USD 10-22.

Volta expects to increase the average annual gross advertising revenue by 77 percent from today's USD 7,000 per screen to USD 11,500 in the medium term. With two screens per charging station, Volta could generate 23,000 USD annually per column with two charging points.

Network to Grow to 11,000 Screens

With the breakthrough of electric mobility in North America, Volta is counting on increasing interest from retailers and shopping center operators to offer their customers charging options at the POS. Volta has ambitious targets for network expansion and wants to add over 3,500 charging points with 7,000 additional screens.

Expansion to Europe?

Even though Volta is officially holding back on expansion plans to Europe, there are increasing signs that the company is playing with this thought. Through the IPO, the company has sufficient capital to expand beyond the American borders. It remains to be seen whether the Volta business model can be exported to Europe. After all, connection and electricity costs are considerably higher here than in North America.

But in cooperation with established EV roaming partners, charging revenues in Europe could be higher than advertising revenues. However, the fact that large EV charging infrastructure operators have so far decided against DooH integration speaks against this theory.

The situation is different for ultrafast charging providers at petrol stations and service stations. Here, EV users can charge their vehicle with 100-200 kilometres of additional range in 15-20 minutes. Due to the short charging times, users here often remain in the vehicle and can thus be better reached with DooH advertising messages.

Volta runs around 2,500 DooH totems.

Photo: Volta/Business Wire

GREEN CITY

Vertical OoH Meadows

Green bus stops and bridges: After planting bus stop roofs, Germany's outdoor advertisers are testing planted wall concepts in the city.

Balthasar Mayer

After Germany's cities turned roofs into gardens, outdoor advertisers are now experimenting with vertical planting. Two years ago, media owners started to plant the roof tops of their street furniture. Now they are also making city walls greener.

One of the first companies to start this green initiative was Wall, together with the Stuttgart transport company SSB. Last October, they designed the first bus stop covered with plants. The concept involved retrofitting the rear wall of the existing shelter with a planted wall. The plants are watered through the roof surface, which collects rainwater in a cistern installed under the bench of the bus shelter.

Wall turned the rear wall of a bus stop green.

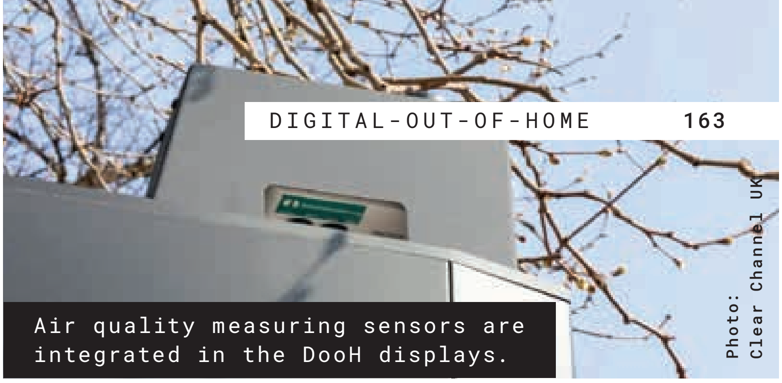
Photo: Landeshauptstadt Stuttgart

The goal of this pilot project is to make urban areas greener and to help the city adapt to climate change. To create and install the green rear wall, Wall and SSB cooperated with Vertico from Freiburg. Around ten different plant species grow along the bus shelter, including golden strawberry, bergenia, shield fern, and silver bellflower.

Part of the pilot project is not only retrofitting the existing bus shelter with a planted wall. Equally important is testing the maintenance-intensity of the plants and the durability of the watering system to see whether they are suitable for everyday use. And first and foremost: observing passengers' reaction to the green project.

Plants and Screens on a Wall

Shortly after Wall's and SSP's bus stop project, competitor Ströer started a similar venture – this time with integrated DooH screens: a vertical garden on a city train bridge in Munich. The gray façade of the bridge is now covered by a green area, upleveling its aesthetics and carbon footprint at the same time. The planted façade is supported by steel profiles and composite panels. Fleece pockets are attached on the substructure as vegetation carriers for the 2,240 plants of 11 different species. Integrated in the structure is watering system which is fully automated to keep maintenance trips to a minimum.



Air quality measuring sensors are integrated in the DooH displays.

Photo: Clear Channel UK

SMART CITY

DooH Measures Air Quality

Hyperlocal data via DooH: Clear Channel UK and the Imperial College London developed screens with built-in air quality sensors.

Balthasar Mayer

The Breathe London network is an initiative developed by the Environmental Research Group (ERG) of the Imperial College London. Among its investors are the City of London and Bloomberg Philanthropies. The goal is to provide Londoners with hyper localized air quality data in real time via the Breathe London website.

To support the initiative ERG, launched a pilot project together with the OoH company Clear Channel UK: DooH screens with integrated sensors that measure the air quality in their surroundings. For this solution, Clear Channel's product development team worked closely together with the ERG, the sensor manufacturer Clarity Movement and its digital display partner Amscreen. The result is a standardized, scalable product enabling a quick and easy rollout of air quality sensors across the national network of digital advertising displays.

The concept was tested in London's Barking and Dagenham district, specifically chosen for its heavy traffic. In three pilot displays, sensors measure nitrogen dioxide and particulate matter levels. Neil Chapman, director of product development at Clear Channel, comments: "Out-of-Home advertising most often exists in densely populated areas, where air quality data is needed most and can bring most benefit to the public."

The data from Barking and Dagenham is transmitted to Breathe London, together with data from around 300 similar sensors across London. To provide accurate information about the city's air quality, Imperial Institute scientists then match the incoming data with reference data.

Senior air quality analyst Andrew Grieve stresses: "Air pollution is the biggest environmental risk to health in the UK and globally." He further points out that the World Health Organization recently updated its guidelines, setting much lower targets, which highlights the necessity to take further action in protecting public health. By monitoring air quality, scientists are able to determine whether policies are moving into the right direction.

Invidis commentary

The Smart City and the Green City of tomorrow will depend on the help of sensors, ideally an entire network of sensors continuously monitoring certain environmental parameters. It is not a new idea to equip OoH and DooH street furniture with measuring elements to create an effective solution that is also cost-efficient for the municipalities. However, the Breathe London project shows another important aspect: If sensor-based measurement data is to be successful, it must be visible to the public. Ideally in such a way that citizens can easily access the data and understand its benefits. The Breathe London website does this in an exemplary manner.

STRÖER

The Second Display Legion

They want to double the number of roadside screens and introduce new LED concepts: Ströer is driving the digitization of outdoor advertising at a rapid pace. But the success is not purely based on DooH.

Balthasar Mayer

As soon as Ströer reported to have installed their thousandth digital roadside screen in the end of 2021, they immediately announced plans to install a further 1,000 and have them integrated into existing networks by 2023. Reason for this massive expansion is the strong demand for DooH infrastructure, says Ströer.

The expansion also exceeds the roadside: Under the term Public Video, the company wants to push digital advertising in public. Ströer's current inventory consists of 6,000 indoor and outdoor digital premium screens at traffic hubs – train stations, streets, shopping centers, and subway platforms in 170 major German cities. Together with the digital longtail inventory of smaller screens and ambient touchpoints, Ströer claims to generate more than 15 billion contacts on around 70,000 screens per month.

New LEDs in German cities

Part of Ströer's strategy is constantly testing new formats and products. In various German cities, the company uses LED to test new concepts. In fall 2021, for example, Ströer installed an LED wall in the undergrounds of Munich's Karlsplatz.

For the IAA Mobility in Munich, the group also mounted temporary three-sided LED steles around the exhibition zones and in the pedestrian zone of the Bavarian capital. The four-meter-high displays were used for advertising of the motor show and of selected partners – such as FC Bayern. Consistent with the green storytelling that prevailed at the exhibition, the rental steles were decorated with plants. Some of the triangular LED towers are now semi-permanently installed at Munich Central Station.

In March, Ströer launched a new DooH concept in Hamburg. "The City Towers" look like traditional advertising pillars but are equipped with 3.25 square meters of LED on the front in portrait format. By fall, the moving image network is to comprise 100 locations on main traffic routes and in pedestrian areas.

These high-frequency locations reach 3.4 million advertising contacts daily between 6 a.m. and midnight. For the program loop, Ströer sticks to its familiar concept: a mix of 10-second commercials and editorial content.

The plus makes all the difference

Expanding capacities comes at a time when Ströer is well positioned economically. In the first quarter of 2022, the company generated the highest revenue of its history. Out-of-home sales developed particularly well with a plus of 55 percent – despite the pandemic and the war in the Ukraine. For the entire year, Ströer expects a growth rate of 10 to 14 percent in revenue at Group level.

Ströer assigns these positive numbers to its OoH-Plus strategy. Combining the OoH core business with Digital & Dialog Media and DaaS & E-Commerce business areas – with the company Statista – has proven successful, especially in challenging times. A good foundation to further push the DooH expansion.

A new form of targeting

By combining sociodemographic data with behavioral data, Ströer's targeting of outdoor advertising campaigns becomes even more effective. OS Data Solutions for example, a joint venture between the Otto Group and Ströer, provides information on personal interests of the target groups. These data complement the existing database on age and gender, which is made available via anonymized swarm data from Telekom Germany.

In collaboration with Deutsche Telekom, Ströer now claims to have developed "a more advanced and future-proof" targeting model for digital outdoor advertising that intelligently combines both data sources and enables more efficient targeting in public spaces.

With the new targeting tool, DooH spots can be played out programmatically via the Ströer public video network – exactly when and where an above-average number of people from the target group are close.

The developed solution works without passing on cookies or mobile advertising IDs. This enables DooH campaigns as well as online/mobile to be optimized based on identical target group data, while adhering to data protection requirements.

New three-sided LED stele by Ströer at Munich Central Station.

MARKET

Big Media joins the Club

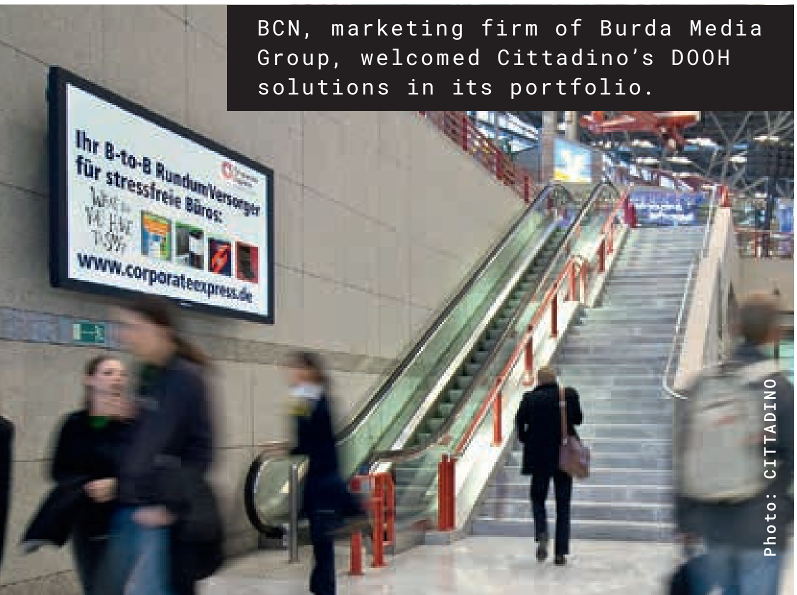
Large players from traditional and online marketing are increasingly entering the digital out-of-home market. Examples include Burda Media and Yahoo.

Balthasar Mayer

It is a well-known fact that new players are continuously entering the DooH market. And not only start-ups push into the industry; established companies and organizations are starting to see the digital-out-of-home market as an attractive business extension.

An example is BCN, the marketer of Hubert Burda Media. At the end of 2021, the company announced that it would include Cittadino's DooH networks in its offering.

BCN says it serves almost all touchpoints along the customer journey. Its network reaches more than 64 million people across all channels – in print, online, social media, in-games, hyperlocal and live events. Now, Cittadino's digital-out-of-home touchpoints are being added to reach new attractive target groups.



BCN, marketing firm of Burda Media Group, welcomed Cittadino's DOOH solutions in its portfolio.

Photo: CITTADINO

According to Cittadino, a subsidiary of Tank & Rast, its inventory includes more than 7,000 screens at airports, freeways, shopping centers, and Sanifair facilities, which reach around 400 million advertising contacts per month in total.

The partnership is part of the marketing company's new strategy: BCN aims to make itself independent from the rest of the group as a marketing organization and is specifically looking for new partnerships. BCN's Managing Director Burkhard Graßmann described DooH "as the optimal complement to our portfolio."

For big online and IT companies, digital signage and DooH are also interesting fields to generate more market share. Among others, this was demonstrated this year by Yahoo. The internet pioneer strengthened its DooH activities through a cooperation with Hivestack: Yahoo's omnichannel DSP thereby gets access to the global DooH Hivestack inventory via the Hivestack SSP. The access is possible through real-time bidding transactions via open exchange as well as private marketplace deals (PMP).

The combination of both technologies is expected to enable cross-channel programmatic DooH campaigns on a global scale. "DooH combines high-impact creativity with cost efficiency as part of an omnichannel campaign strategy," said Iván Markman, Chief Business Officer at Yahoo. DooH has great prospects, not only within its own silo.

ACQUISITION

Buying British

After heavy losses during the Corona crisis, British outdoor advertiser Ocean Outdoor was acquired by a financial investor.

Florian Rotberg

UK DooH media owner Ocean Outdoor, known for the world-famous LED landmark at Piccadilly Circus, was acquired by its largest shareholder in May 2022: Financial investor Atairos valued the company at 463 million British Pounds, which corresponds to around 550 million Euros.

London-based Ocean Outdoor is primarily active in the UK, the Netherlands and Scandinavia. It also operates a smaller mall network in Germany. In recent years, Ocean has grown into a major European DooH provider through a series of acquisitions, including the DooH business of Visualart.

Then came the pandemic with series of lockdowns and Ocean Outdoor registered significant losses. Sales particularly dropped in major cities such as London and in shopping malls.

In the past year, sales increased again, but Ocean still recorded a total loss of 30.3 million pounds in 2021. In recent months, the pressure from the financial markets grew, and the management decided to put the company up for sale. Atairos offered USD 10.40 per share – 21.9 percent above Ocean Outdoor's average share price over the previous six months.

According to CEO Tim Bleakley, Ocean again registered increased bookings in the fourth quarter of 2021 and the beginning of 2022.

Building a giant?

In Ocean's day-to-day business, not much will change in the foreseeable future. The management is busy steering the OoH business through the volatile advertising market in all seven European countries.

At the same time, the new owners plan further acquisitions to make the company a competitor to JC Decaux and Ströer. The international Clear Channel business is currently up for sale and could be an interesting option.

The Piccadilly Lights are marketed by Ocean Outdoor on behalf of Landsec.

Photo: Ocean Outdoor

DIRECT

Read the story behind this picture on page 100.

ORY

Photo: Adrenoramaaa

CONCEPT International

Concept International is a Value Added Distributor of digital signage hardware. The Munich company supports more than 250 digital signage projects per year with over 30,000 digital signage players (Windows, Linux, Android, Raspberry) and is currently the leading provider of signage players according to Invidis. In addition to experience and know-how, Concept International offers its system integrators the "Total Preparation Service": Project-specifically configured, software-activated and burn-in tested, the Mini-PCs can be quickly rolled out in large quantities. System integrators also receive attractive payment terms.

With the versatile range of GIADA, the experienced distributor offers high-performance PCs for all application scenarios, from entry-level to high end. The latest additions: the proven booksize PC D611, now with the latest Intel CPU up to 4.7 GHz and support for three 4K screens and the new Android entry-level model GIADA DN76, at an unbeatable price-performance ratio and HexaCore CPU. All PCs can be conveniently installed behind flat screens and guarantee reliable 24/7 continuous operation with programmable watchdog and time control, thanks to Giada's patented JAHC technology.

New this year: LED walls! With LEDMAN, the Munich company represents a technologically leading manufacturer whose 16:9 modules are manufactured using fully encapsulated COB technology. Various indoor and outdoor series in all pixel sizes complete the offer. Guarantees of up to 5 years, on-site service, vandalism insurance and monthly payment terms complete the offer.

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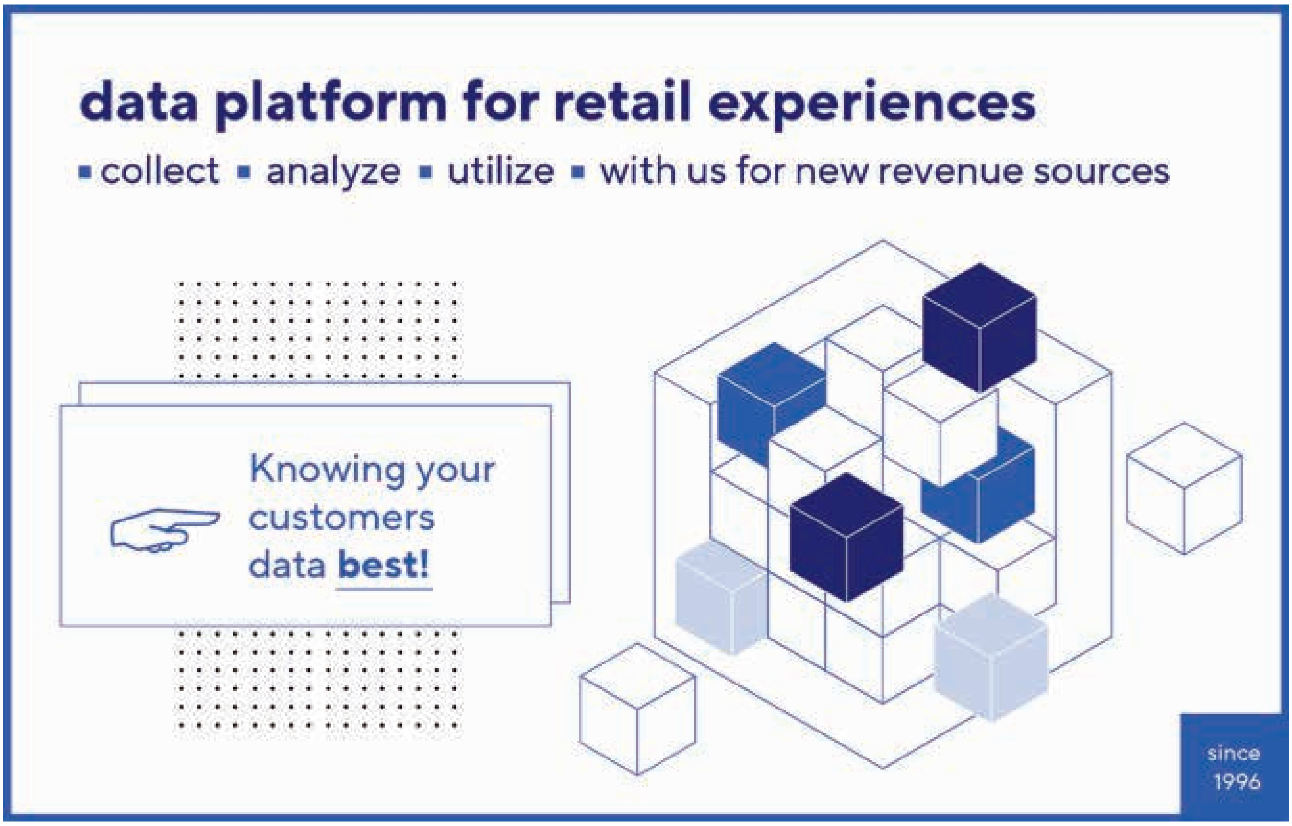

We like challenges. We like solutions. That's why we develop software. Software for a sustainable connection to the customer. And we think in data. That's why we know how important it is – especially in real time.

Our **Platform for retail experiences** is the core of data collection and data analysis. It connects to the most recognized tools in the Real Live Customer Journey to make the most of every touch point. Our guiding principle: knowing your customers data best.

The journey follows a gamified, supportive and guided shopping experience for the customer. Based on our undisputed proven digital signage core "kompas" since 2006.

Our goals are new revenue sources in the store, cost savings, process optimization and sustainable production. The goals are identical? Then we should talk now.

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Patrick Schröder

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Phone +49 (0)221 921 260 0

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Dise

Dise is the IXM platform for global brands and leading retailers

Dise connects the customer journey from online to in-person with digital touchpoints in-store. Offering the one platform designed specifically for retail, sold through a global partner community.

The Dise CX Portal is the cloud based In-store Experience Management Platform. The intuitive user interface is tailored for retailers demanding scenario driven scheduling and campaign planning to optimize business growth and customer satisfaction. Easy to integrate to external data sources such as DAM, PIM and MRM. Designed for retailers and brands with global scalability needs.

We are a Swedish retail tech company aiming to provide the best in-store experience for end customers and accelerate our partners business goals. Whether you are a full-service partner, digital agency, global brand or leading retailer we are here to support your digital in-store solutions.

dise

Dise International AB

Richard Horsey,
Global Head of Sales

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www.dise.com

DynaScan Technology

DynaScan Ultra-High Brightness Digital Signage Displays

DynaScan is the premier manufacturer of high brightness digital signage displays. With a portfolio of products that include indoor, outdoor, and window-facing LCDs, DynaScan offers attractive and engaging options for virtually any display application.

Brightness levels as high as 6.000 nits allow DynaScan high brightness displays to shine bright in direct sunlight—making them especially ideal for window-facing applications such as retail stores and restaurants. With models ranging from 32 to 100 inches, DynaScan offers the largest portfolio of professional high brightness digital signage displays in the industry. This year, DynaScan introduced new IP56 weatherproof outdoor displays and kiosks available in a variety of sizes and single-sided or dual-sided configurations. Featuring direct sunlight viewable images, IK10 vandal resistance, and superb color, the displays offer unsurpassed security, performance, and visibility.

DynaScan works closely with system integrators around the world to deliver premium display solutions for its customers. With offices in Europe, Asia, and North America, DynaScan is equipped for international rollouts and support.

DynaScan

DynaScan Technology

Kerstin Muller

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www.dynascandisplay.com

easescreen

ONE SOLUTION FOR ALL APPLICATIONS

By Professionals for Professionals

With our international partner network in over 100 countries, we have now implemented more than 10,000 successful projects. For every challenge, we have the right certified partner in your region. Rely on their expertise and know-how for your customized solution – from digital door signs to a global digital signage network.

For simple usage

With easescreen, content creation and management become child's play. In just a few simple steps, you can create and distribute engaging content that you can keep up-to-date automatically. Digital communication has never been so easy. Contact our sales staff – we will be happy to advise you!

For continuous innovation

For more than 20 years, easescreen has played a key role in shaping the digital signage industry: Customers and certified partners from over 100 countries trust in our know-how, and we are one of the market leaders in the DACH region and beyond. We don't chase trends – we set them. This is how we demonstrate our technological leadership again and again.

easescreen
DIGITAL SIGNAGE SOLUTION

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California
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Grassfish

Experience. Difference.

We believe that outstanding experiences make all the difference. It's how we separate the okay from the wow. And the way true brand loyalty is built. Therefore, our mission is to every day enable extraordinary customer experiences. Grassfish has earned recognition for its powerful In-store Experience Management Platform and dedicated people, helping leading global brands stand out and beat the competition.

Grassfish IXM Platform – Our In-store Experience Management Platform offers brands and retailers a unified way to manage all Digital Signage touchpoints on a global scale. The Grassfish IXM Platform is developed to be fully integrated as part of the digital ecosystem. Enabling a powerful combination of high-quality visuals, real-time data, and interactive applications to create dynamic and engaging in-store experiences.

Consulting – We bring category expertise within Digital in-store. Acting as your strategic partner, we bridge the gap between online and in-person. Creating retail experiences that make all the difference.

With more than 100 people in Austria, Germany, Sweden and UK, Grassfish serves customers in all retail areas like BMW, Porsche, O2 Telefónica, Commerzbank, Lufthansa, J.Lindeberg, Spar and DHL.

GRASSFISH

Grassfish

Helmut Pfeiler,
Global Head of Account Management

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Phone +43 1 522 02 70

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www.grassfish.com

iiyama

As one of the world's leading manufacturers of screens and displays, iiyama stands for special expertise in the monitor market. Founded in 1973 in Nagano, Japan, iiyama has built a strong reputation as a provider of best-priced, high-performance display solutions and outstanding service. The long-established, customer-oriented company has been active in Germany with great success since 1993.

Initially, the portfolio ranged from low-priced LCD/LED entry-level monitors to high-quality business devices with ergonomic features for professional use. Over the years, the innovative company has developed into an expert for digital signage, LFDs and interactive LFDs. A clear focus is on (multi-) touch screens and smart large format displays. These range from the interactive desktop model for office use to the highly robust device for 24/7 use in high-use environments with screen diagonals between 10 and 98 inches as well as state-of-the-art (multi-)touch technologies with up to 50 touch points. iiyama relies in particular on projective capacitive (PCAP) models (FHD & UHD), although the company also offers the full range of resistive, SAW and infrared touch screens in various sizes and formats up to 98 inches.

iiyama's extensive portfolio includes high-quality stand and mounting systems as well as advanced Unified Communications products. For the perfect all-in-one solution, iiyama also offers a modular slide-in PC (Win11) – cable-free and ready for immediate use.

iiyama

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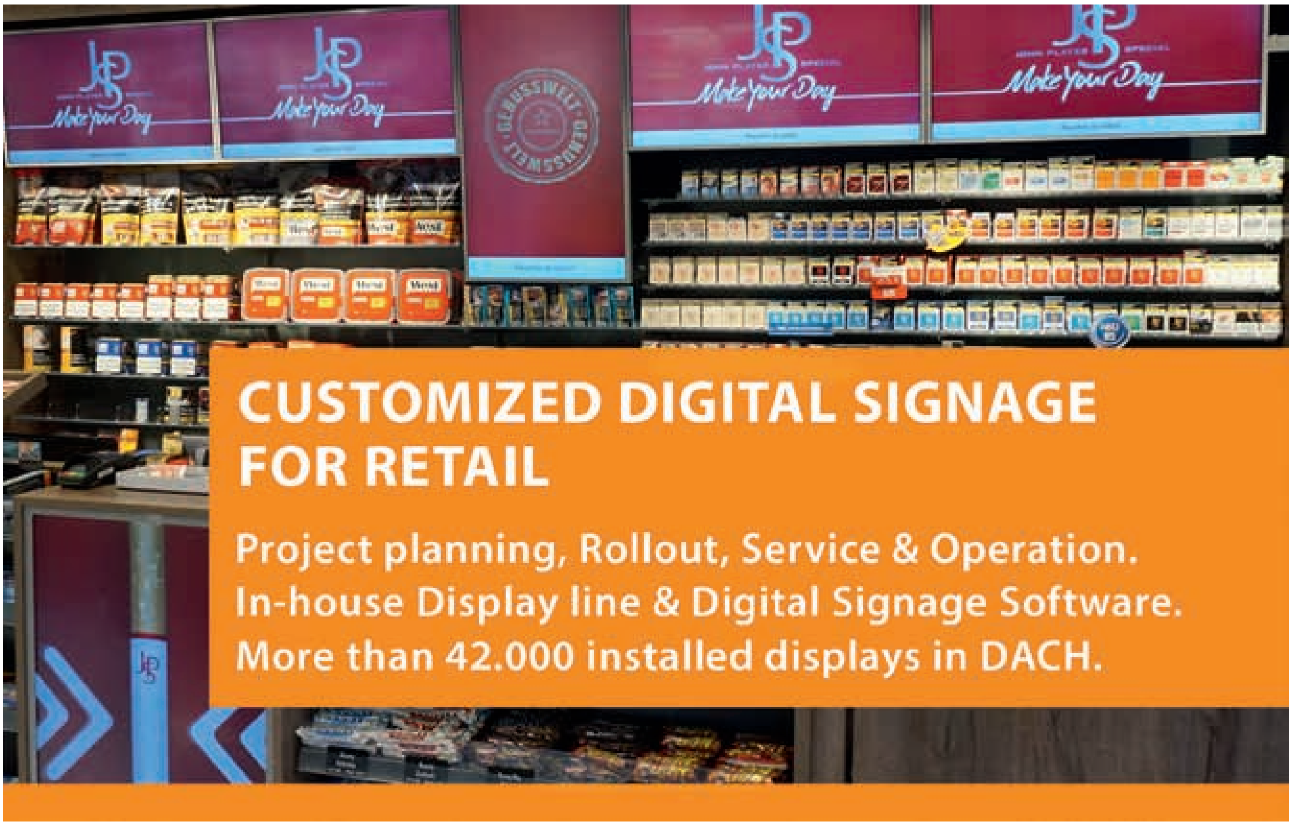
sales.de@iiyama.com

www.iiyama.de

PMS Perfect Media Solutions



Innovative and sustainable digital retail and signage solutions

For almost 20 years, we have been planning and implementing customized digital signage and media solutions for various retail-, event-, stadium- and corporate clients.

As one of the leading companies in this industry and a full service provider, we support our customers in all project areas:

- Consulting and conception
- Prototyping
- Production of individual solutions incl. special formats and special requirements
- In-house display line and digital signage software
- Independent system integration
- Realisation and roll-out
- Individual service level agreements

Besides a high quality end product, sustainability and scalability are always our first priority.

Get in touch with us – we look forward to hear from you!

pms® PERFECT MEDIA SOLUTIONS

PMS Perfect Media Solutions GmbH

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Managing Director

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20253 Hamburg

Germany

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www.perfect-media-solutions.de

VESTEL

TAILORED TECHNOLOGY – Your Challenge is Our Motivation

Since 1975, VESTEL has been producing and selling TVs and professional displays as an OEM manufacturer under more than 500 brands worldwide. With a production capacity of 18M displays annually, 1.1M sqm production facilities and the consistent implementation of Industry 4.0 standards and automation, VESTEL offers the perfect conditions for your projects.

Our Visual Solutions lineup consists of Professional Displays in the sizes 32" up to 98", Videowall Displays, LED-Wall, Interactive Flat Panel Displays, as well as DOOH and HotelTV solutions.

We offer more than the usual standard: Powerful Quad-Core Android SoC / AV over IP / open APIs / customer specific technical modifications and production under private label / high problem-solving expertise and flexibility with the integration in existing systems.

VESTEL

VESTEL Germany GmbH
Parkring 6
85748 Garching
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visualsolutions@vestel-germany.de
www.vestelvisualsolutions.com

ABOUT US

Photo: Adrenorama

Read the story behind this picture on page 100.

INVIDIS

At the Heart of the Industry

Consulting, conferences, coverage: invidis consulting provides the digital signage and the DooH industry with food for thought.

Balthasar Mayer

Since its beginnings 15 years ago, invidis has developed into the leading industry portal in Europe. Our newsletter offers the latest news about the digital signage and the DooH industry from Monday to Friday. With more than 2,000 subscribers and an above-average opening and click rate of 26 and 25 percent, it is one of the most important sources of information in the industry.

Florian Rotberg at the DSS ISE 2022.

Photo: ISE

Research on the showfloor on build-up day at ISE 2022

What is important to us: In addition to user stories, product and personnel news, we provide lots of exclusive material on invidis.de – interviews, background analyses, and on-site reports from our experts. This is how we offer real value for our readership.
Another sign of the quality of our articles is their lasting relevance: Many of the more than 18,000 articles have been clicked regularly through online search for years.

An ideal complement to our news coverage is our video format invidisXworld, which we distribute through our website. Of course, we are also present on social media and are committed to sharing our content on as many channels as possible.

In addition to publishing, invidis also established itself as a consulting firm specializing in digital signage. The invidis name represents thought leadership and strategic consulting in the field of digital signage and digital technology in the real world, for example in retail or in offices.

invidis founder Florian Rotberg, Stefan Schieker – founder of Result MC Management Consultant – and the joint team of experts support clients worldwide with their consulting capacities at locations in Munich and Dubai. The focus is on scalable, sustainable digital concepts and strategies. Our services are diverse, as the following examples illustrate:

- We evaluate and develop business models and strategies for investors and M&A departments. In addition, we offer strategic due diligences on the buy- and sell-side.

- We conduct market and competition analyses for digital signage integrators and support them in M&A activities.

- We develop strategies for marketing managers regarding cross-platform experiences and content.

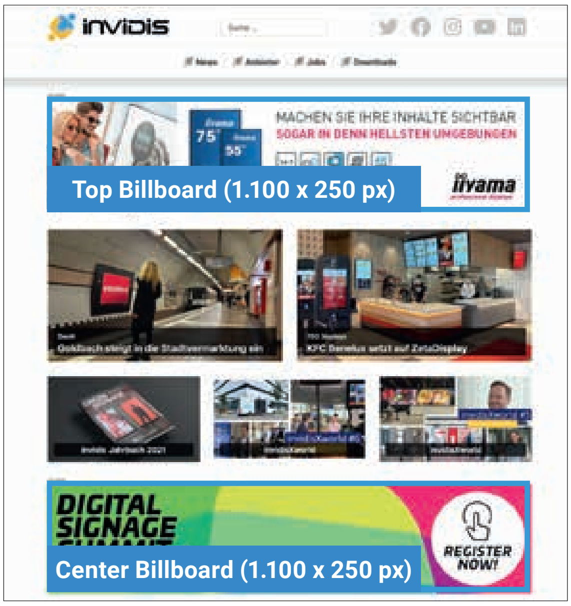
- We provide retail architects and store planners with customer journey and mindset analyses as well as digital touchpoint concepts.

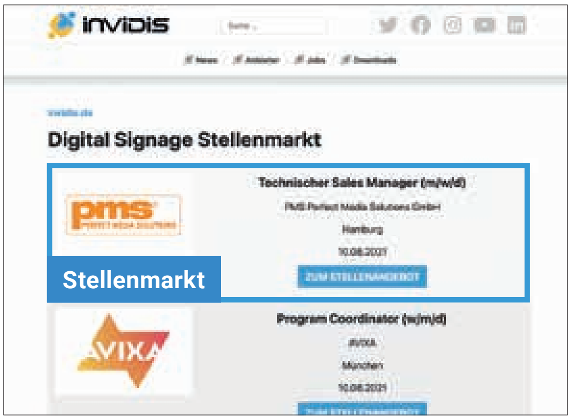
- We provide CFOs and analysts with recommendations for action, based on retail analytics.

- We support CTOs with tenders; in addition, we evaluate providers and help with the connection of front-end and back-end solutions.

Our own conference series, the Digital Signage Summit (DSS), is organized in a joint venture with ISE. In summer, the DSS Europe is traditionally held in Munich. This is where the who's who of digital signage gathers to talk about the future of the industry. For us, this means finding the best speakers, stories, and innovations for our audience.

RATE CARD





invidis.de – Online-Banner

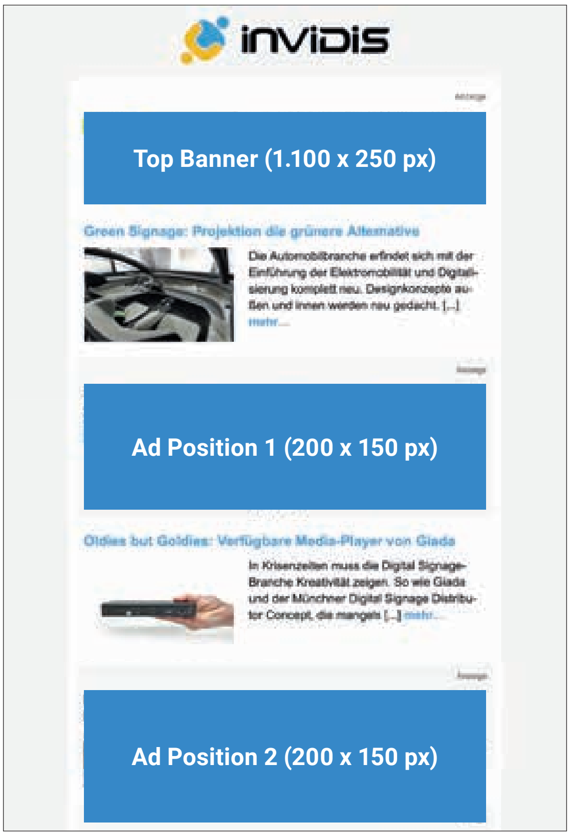
- Weekday news
- Annually more than
  - 1.850 Articles
  - 4.150 Photos
  - 434.000 Unique Visitors
  - 849.000 Page Impressions

Booking Options

- Top Billboard
- Center Billboard
- Job Listing

PRODUCT	FORMAT	PRICE
Top Billboard	1.100 x 250 px	990,- EUR*/WEEK
Center Billboard	1.100 x 250 px	880,- EUR*/WEEK
Job Listing		199,- EUR*/90 DAYS

*All Prices are net/net



Newsletter

- Weekday newsletter
- Subscribers: 2.100
- Opening rate: 26 %
- Click rate: 25 %

Booking Options

- Picture-/Text ad
- Top Banner

PRODUCT	FORMAT	PREIS/WEEK
Top Banner	1.100 x 250 px	1.000,- EUR*
Ad Position 1	200 x 150 px	690,- EUR*
Ad Position 2	200 x 150 px	590,- EUR*

*All Prices are net/net

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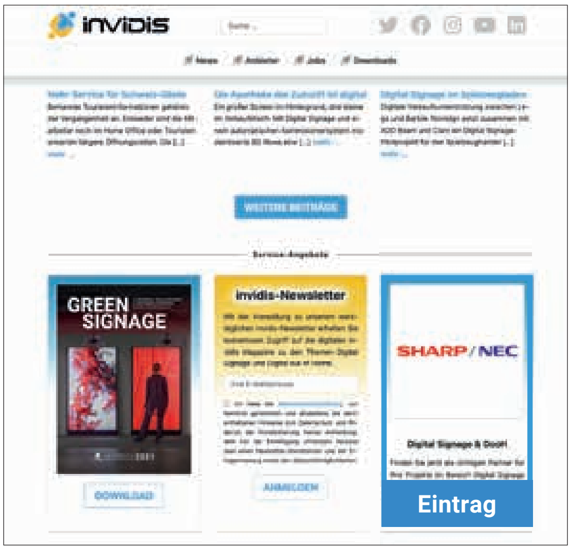
RATE CARD



Index of Suppliers

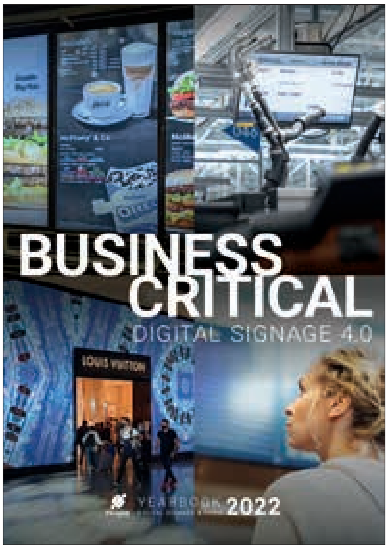
- Online directory with over 500 suppliers

Booking Options

- Premium entry

SERVICE	ENTRY FREE CHARGE	PREMIUM ENTRY EUR 590 PER YEAR
Company name	yes	yes
Logo	–	yes
Adress	–	yes
Contact	–	yes
Links (Website, Facebook, Twitter, YouTube)	–	yes
Company or product text	–	yes
Choose from max. 3 Categories	–	yes
Widget on invidis.de	–	yes

*All Prices are net/net

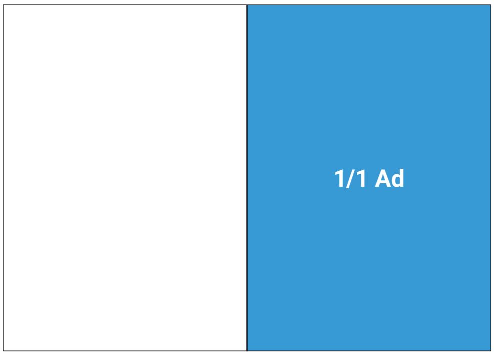


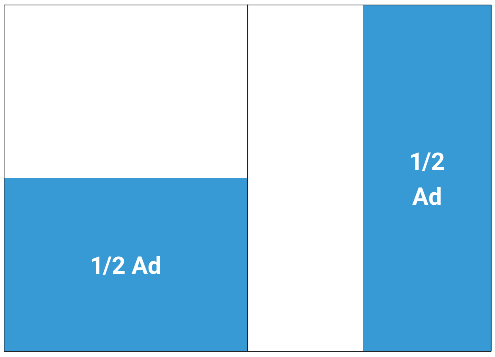
Yearbook

- German and English language version

Booking Options

- Ad
- Company profile





PRODUCT	FORMAT	PRICE
Ad, inside front cover (U2), 1/1 page, 4c	210 x 297 mm	2.890,-
Ad, inside back cover (U3), 1/1 page, 4c	210 x 297 mm	2.790,-
Ad, back cover (U4), 1/1 page, 4c	210 x 297 mm	2.990,-
Ad, editorial section, 1/1 page, 4c	210 x 297 mm	2.590,-
Ad, editorial section, 1/2 page quer, 4c	210 x 152 mm	1.590,-
Ad, editorial section,1/2 page hoch, 4c	103 x 297 mm	1.590,-
Company profile 1/1 page, 4c	210 x 297 mm	1.290,-

*All Prices are net/net

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