1ST QUARTER 2022

JOURNAL 120

REPRESENTING THE BROADCAST AND MEDIA TECHNOLOGY INDUSTRY WORLDWIDE

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Automated Transcription

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Better together

Peter White
CEO, IABM

Welcome to the Q1 2022 edition of the IABM Journal – packed with interesting and informative articles about technologies that cover the full gamut of the BaM Content Chain®. With NAB Show 2022 looming, we can be certain that innovation among IABM members is clearly continuing to thrive.

But before I go further highlighting particular contributions in this edition, I must first thank the many IABM member companies that have got behind our Stand with Ukraine initiative – and also other organizations outside the IABM family who have also expressed their support. All the companies who have put their name to Stand with Ukraine have undertaken to stop supplying products/services and support to Russia. In addition, many have also made significant donations to support humanitarian efforts in the region, and some are also actively supporting Ukrainian communications efforts. I am proud to be part of an industry that backs its convictions with actions and I hope that we can encourage more companies to step forward and publicly stand with Ukraine. As Volodymyr Zelensky has said, 'If we remain silent today, we will be gone tomorrow'.

Our main theme for this issue is Creative Collaboration – how companies and their customers are working together to deliver breakthrough solutions that provide commercial and/or creative solutions to the end user. LiveU's participation in the Live + Wild 5G project (part of the '5G Create' program) is a perfect example of this, enabling film-makers in extreme locations to get hi-res footage back to the edit room at breakneck speed. You can read about the project's success on page 29.

Still on Creative Collaboration, Grabyo has been working with broadcasting giants such as FOX Sports, Univision and UFC to enable truly collaborative workflows by enabling live video production in the cloud. Grabyo's Scott Lunn says: "Truly decentralized production will bring new levels of reliability, creativity and collaboration to video workflows...that will revolutionize the broadcast and media industry once again".

Skyline comes at collaboration from a different angle, positing that it is key for any (and every) digital transformation project. In a really well-argued article on page 34, Skyline's Thomas Gunkel walks us through the process, concluding that "[it] can only be successful if people and platforms have fast and secure access to the right data at the right time to collaborate".

In a thought-provoking opinion piece on page 4, Dalet's Robin Kirchhoffer looks at how to ensure customers can get ROI – their money's worth – when investing in media technology; how to balance risk against reward by adopting a sound innovation strategy. A methodical approach is his answer, but in which instinct still has a place.

Finally on the subject of collaboration, I must recommend Spicy Mango's 'Together in electric streams' article on page 37. As well as being a very entertaining read, it also points a clear path for how OTT platforms should be driven from the UX starting point to be built on an 'ensemble' architecture to avoid fragmentation and be able to scale as their user base grows.

Nigel Burtt and Paul Treleaven – IABM's Technology Specialist Consultants – work tirelessly to keep members up to date with the latest standards and regulations, and indeed represent members' interests on several industry organizations. They are responsible for all the content in the Technology News section of our website. The pace of change in both standards and regulations seems to be ever accelerating, and Nigel and Paul have kindly given us a summary of the latest developments and news on pages 52 to 56.

I've just scratched the surface in this brief scan of just a few of the excellent articles in this edition of the IABM Journal. I heartily recommend setting some time aside to read it: there is valuable knowledge here – and lots of it!

As I write this I'm beginning to think about my packing list for NAB Show later this month. I suspect I am not the only one who feels badly out of practice at this, but it will definitely be worth persevering; I can't tell you how much I am looking forward to seeing so many of our members in person again – at last!

Peter White
CEO, IABM

Opinion

How to get your money's worth when investing in media technology

Robin Kirchhoffer
Senior Director Product Marketing, Dalet

When it comes to investing in new and emerging technology, there is a foreboding sense of high risk; but with that high risk comes high reward. How can you adopt a sound strategy with innovation? We discuss how a methodical approach can help.

Technology is a place that rarely remains stagnant. The entire nature of it is evolution, driven by innovation. That evolution is why it is always a matter of high risk. New and emerging technology carries the potential of either being a new standard that completely revolutionizes an industry; or it disappears into the sunset, replaced by something else. A good example of this? In the 2000s, the HD DVD was once believed to be the next generation of home entertainment and media data storage, but it was to be Blu-Ray discs that eventually reigned supreme in the industry. So how do you invest in technology while avoiding the discovery that you invested in the wrong direction? It comes to understanding and knowing the players involved, and in trusting instincts an inch more than perceived trends.

There are many different types of platforms serving the needs of a content producer, including Production Asset Management (PAM), Media Asset Management (MAM) and Media Logistics Platforms. All of these are also regarded as 'Intelligent Agents' deployed in and across different stages of content production operations. Combinations of internal and external teams plan, produce, deliver and analyze content and its consumption. This is a classic 'Supply Chain' directly involved in the flows of products, services, finances, and/or information from a source to a customer. Intelligent Agents are used to increase productivity, agility, flexibility and resilience of Supply Chains. Much of this peer-reviewed research, from across multiple industries and research fields, contains findings that are highly transferable to content production.

Curtain Going Up: Understanding the Market's Players

Studies have found that two areas of Intelligent Agent capability in particular provide the catalyst for

'Intelligent Agents' are used to increase productivity, agility, flexibility and resilience of Supply Chains

simultaneously achieving increased productivity and increased worker well-being: **Automation and User Experience**. It is estimated that less than 5% of all occupations are considered to be candidates for full automation, but 60% of occupations have been observed to have at least 30% of their activity that could be automated with current technology, and this will increase as technology capabilities progress. Rather than this being seen as a threat, automation offers users the chance to offload the mundane and repetitive to machine resources and reduce stress in their daily working life. This leaves them to focus on the creative activities, delivering more in shorter timescales, and freeing time for other interests outside work.

Intelligent Automation aims to develop Intelligent Agents to handle business workflows and processes automatically. Automation can drive flexibility and increase resilience through improved material-flow, information-flow, supervision and control, and relationship automation. Studies indicate that managers in industry typically lack an overall picture of what automation is possible in their operation and lack awareness of what influences successful automation implementation.

It is estimated that less than 5% of all occupations are considered to be candidates for full automation, but 60% of occupations have been observed to have at least 30% of their activity that could be automated with current technology

Then there is the User Experience that relates to how users can achieve more from each working day and have a more positive experience doing so. User Experience (UX) extends far beyond this to a worker's emotions before, during, and after using the Intelligent Agent. Although considered by some in industry to be a soft requirement, User Experience as a technology enabler links to the bottom line of organizations. Delivering a sustainable competitive advantage in an organization through compelling user experience helps eliminate many levels of manual activities, reduces costs, increases revenues, enhances asset utilization, reduces error production, and facilitates lower process times.

Research into Intelligent Agent-enabled architecture includes the distribution of tasks, knowledge and control to solve a given problem, with factors such as effective coordination mechanisms, negotiation, conflict resolution, and communication protocols. In the study of Supply Chains, integration is achieved when the information and communication systems of all stakeholders are able to seamlessly exchange information through all activities from planning to delivery.

How Intelligent Agents and Supply Chains Integrate

Good integration and exchange of information can also significantly help mitigate Supply Chain risks. Key Supply Chain teams and partners are a source of environment information which is a critical input in risk prone situations. Cross-functional integration between different departments in an organization acts as information processing capability for absorbing, processing and timely implementation of information for responding to changes in the environment. Studies show that companies that invest more in Intelligent Agent information sharing capability across their Supply Chains achieve improved overall organizational performance and agility. This involves managing

Studies show that companies that invest more in Intelligent Agent information sharing capability across their Supply Chains achieve improved overall organizational performance and agility

the relationship between information sharing and firm performance, and integrating both information systems and operations management.

Intelligent Agents provide knowledge engineering, information architecture, and high-quality data sources. With increased knowledge bases and automation decision-making processes, Intelligent Agents help Supply Chains by facilitating information exchange among various teams. Over time, three key types of metadata have developed that need to be managed by an Intelligent Agent. Business metadata are the set of descriptions that make the data more understandable by business users and aid the defining of business rules. Operational metadata are information automatically generated during data processing, such as descriptions of the source and target data. Technical metadata expresses how data is represented, including data format, structure or schema.

Taking a Bow: Getting the Most Out of Your Tech Investments

Understanding all factors at play will help you find more about how your business can benefit from new technology, and give you a better idea of what new technology should take hold. The picture presented here is one of content production being transformed, with teams being motivated and empowered by new technology, and delivering significant productivity and resilience gains for content producers, while supporting new working paradigms and strengthening worker well-being.

Make sure, before investing into any new technology, you get a full grasp of what is involved in any success of an innovation:

- **Intelligent Agents**
- **Supply Chain**
- **User Experience (UX)**
- **Automation**
- **Integration**

New trends and innovations in Intelligent Agent user experience will continue to take into account advances in Artificial Intelligence and behavioral psychology, evolving how teams interface with technology and redefining their roles to focus on what humans can best deliver: creativity. We at Dalet continue to lead this field for content production, remaining in the forefront of innovation, whether it is transitioning productions and production studios to cloud-based operation to helping our clients achieve optimal return on their technology investment and ensuring all those that use it make more out of each working day. Dalet believes in evolution of a platform and of an industry, and we are ready to answer your questions about what we can do to help you evolve your media productions and content delivery.

XtraMotion by EVS has been designed to allow broadcasters to deliver super slow-motion replays from virtually any angle they choose on a production

EVS – BaM Award® Winner
XtraMotion – cloud-based super slow-motion service

Combining the Cloud and Artificial Intelligence to deliver super slow-motion replays from any camera angle

While super slow-motion is a much sought-after effect for replays in live sports productions, its usage is often constrained to a few carefully selected camera angles, due to high infrastructure costs and the fact that most point of view cameras do not support super slow-motion video.

XtraMotion changes the game. The new software application developed by EVS has been designed to allow broadcasters to deliver super slow-motion replays from virtually any angle they choose on a production. Based on both cloud processing and machine learning, the service enables the transformation of footage from any camera angle on a production into high-speed video using frame interpolation. As a result, productions can easily increase their super slow-motion coverage without having to deploy additional hardware on site.

XtraMotion can handle any production format – from 1080i to 1080p as well as UHD-4K with HDR – and any original framerate, enabling the transformation of a 60fps video into a very smooth 180fps video as well as a native 180fps into a 540fps video.

As a cloud service available on-demand, the decision to activate XtraMotion can be taken in instants and productions can also easily scale it to the capacity they need. It integrates tightly into the EVS live production ecosystem, allowing replay operators to seamlessly clip any content from anywhere on the network, render it to super slow-motion with a simple touch of a button, and play it back with the desired frame rate seconds after.

In addition to replays and highlights, operators can also apply the XtraMotion process to openers and closers, as well as archived content, providing more opportunities to enhance the narrative of a production.

The launch of XtraMotion took place in May 2021, following a successful trial period with FOX Sports. It was first deployed as a Proof of Concept (POC) at Super Bowl LIV, in February 2020, after which FOX Sports took the decision to make XtraMotion an integral part of its productions. It was at Daytona 500 that XtraMotion truly demonstrated the extent of its storytelling capabilities by allowing viewers to watch super slow-motion replays from the in-car cameras – a first in the history of live sports broadcasting.

Laurent Petit, SVP Product and Solutions said: "We truly appreciate the industry recognizing our vision which is to continue leveraging the power of AI in order to improve the quality of live content, and to extend the capabilities of our on-premises equipment with services deployed in the Cloud."

"XtraMotion combines many of the strengths that are characteristics of EVS' success, including AI, the Cloud, replay technology and fast-turnaround capabilities," said Olivier Barnich, Head of Innovation at EVS. "Not only is it a breakthrough innovation, it is also a major achievement in terms of collaboration between all R&D teams who've worked tirelessly together on delivering an exciting new storytelling tool for broadcasters and media companies to take advantage of on their productions."

'The MaskVerse' offered fans a destination where they could build their collection of limited-edition digital masks for every character to unlock surprises and exclusive giveaways

Eluvio – BaM Award® Winner

Broadcast TV's first major NFT endeavor powered by Eluvio

Marking broadcast television's first major NFT (non-fungible token) endeavor, FOX Entertainment and Blockchain Creative Labs launched 'The MaskVerse' NFT marketplace for TV's #1 entertainment series in the US, hit singing competition THE MASKED SINGER, powered by Eluvio's eco-friendly blockchain in October of last year.

'The MaskVerse' was designed to make buying, selling and trading digital THE MASKED SINGER goods – including the first NFT of the show's mascot, 'Miss Masky' – more accessible and intuitive to consumers, while adhering to technical principles important to crypto enthusiasts. 'The MaskVerse' offered fans an exclusive NFT destination where they could build their collection of limited-edition digital masks for every character across all seasons to unlock surprises and exclusive giveaways. Fans were also able to play a voting game, to predict which characters will be eliminated and win the opportunity to buy Gold Mask packs that, when a full collection is completed, granted access to exclusive prizes, and gain status. Upon its initial launch, fans could claim a free NFT of 'Miss Masky,' THE MASKED SINGER's digital mascot. In less than ten hours 'Miss Masky' sold out, as fans claimed 10,000 free Genesis Edition 'Miss Masky' NFTs. In response to users' high demand, Blockchain Creative Labs unveiled a second edition of 10,000 'Miss Masky' NFTs the following day. Since then, fans downloaded over 120,000 NFT packs and created over 100,000 wallets on the platform.

To participate in 'The MaskVerse's' NFT drops, fans created a secure and easy-to-use digital media wallet, through Eluvio, that acts as a digital vault and enables seamless purchasing of NFTs via credit cards or cryptocurrencies. It allows trading or reselling of cards within the marketplace to build full collections and transferring of NFTs to third-party wallets interoperable with Ethereum, Solana, and other blockchains.

For 'The MaskVerse,' all the creative content, NFTs, and digital wallets were integrated as part of Eluvio's secure and eco-friendly blockchain. Last year, FOX made a strategic investment in Eluvio to accelerate the adoption of Eluvio's blockchain platform across the broader media and entertainment industry and provide the underlying technology platform for Blockchain Creative Labs.

Blockchain Creative Labs also selected Eluvio for its low environmental impact. Through a novel compositional and just-in-time protocol, the Eluvio Content Fabric does not make file copies and dramatically reduces the storage, network requirements, and latencies of traditional digital distribution systems; the Fabric's blockchain avoids the computational energy consumption, and costs, of proof-of-work blockchains through its efficient proof-of-authority consensus and seamless combination of on-and-off chain transactions.

Eluvio won the 2021 IABM BaM Award® for its work supporting this endeavor, in celebration of its outstanding innovation and achievement in broadcast and media. According to the IABM judges: "[Eluvio's] entry proves once again how Blockchain really is going to transform media and how we need to start preparing now for web 3.0." The seventh season of THE MASKED SINGER premiered on March 9, 2022, and 'The MaskVerse' entered its second season. For additional details, NFT giveaways, to join the Masked Discord, and more, visit: https://live.eluv.io/maskverse.

'The MaskVerse' offered fans a destination where they could build their collection of limited-edition digital masks for every character to unlock surprises and exclusive giveaways

Telos Infinity VIP – BaM Award® Winner

Martin Dyster
VP Business Development, Telos Alliance

Winning a BAM Award® for the Telos Infinity Virtual Intercom Platform (VIP) is a big deal for Telos Alliance. The BAM initiative is markedly different from many other industry awards in that the shortlisted solutions and ultimate winners are chosen by a wide cross-section of our peers including end-users, technologists, and business leaders. Any product that is recognized by the panel is not just an innovative solution, but it is genuinely important to the market and sets the standard in its category – it is a gamechanger.

Intercom is a mission critical part of most broadcast workflows, and as TV broadcast is transitioning towards a virtualized model, it seems only logical that intercom should be virtualized as well. This is the stance that Telos Alliance took back in mid-2020 when realizing that although the hardware-based Telos Infinity Intercom Platform supported remote working models (one of the driving forces behind an accelerated move towards the virtualization of video production), having to box up and mail out a physical panel to every remote participant was not practical, neither commercially nor logistically. And that is assuming that the recipient is tech-savvy enough to be able to get the device online at their location.

When we set out to develop VIP, we knew it would be a product with tremendous potential if we got it right. As has been the case with many products that have been brought to market in the last couple of years, the global pandemic helped push the development of VIP to the front of the queue at Telos Alliance while numerous enquiries from the marketplace for a virtualized intercom solution further validated our decision to accelerate the product.

Telos always harboured a notion to develop a software panel add-on to the Infinity system, but other priorities had meant that that idea had been shelved back in 2019, with no specific timeline determined to resurrect it. With the emergence of Cloud workflows and a global pandemic accelerating the need for more agile communications solutions, it rapidly became clear that a software panel solution needed to become the number one priority to meet the needs of a broadcast industry during an incredibly challenging period. Telos Alliance was already publicly committed to the development of other virtualised product lines, so this decision did not come out of left field.

So how do you take a product that is built on a hardware platform and turn it into a software equivalent? More importantly, how do you do it quickly and from a standing start?
To begin, hardware Infinity, launched at NAB in 2018, is different to traditional broadcast talkback systems in that it does not have a central matrix and is built on non-proprietary AES67 IP transport where each device on the network (panels, beltpacks, interfaces etc.) replicates the core matrix functionality in a distributed architecture. As a foundation to build a virtualized product like VIP this was highly advantageous because it meant that the software team at Telos Alliance did not need to reinvent a centralized processing engine: we already had that piece onboard each individual hardware panel. This cut down the development time of the virtual product because the DSP firmware of an individual comms panel already existed in a software form that could be repurposed if we could find a means to do it.

The answer came in the form of software containerization, which is means to package software code and all its dependencies, so that an application runs quickly and reliably from one computing environment to another. In short, each container comprises an individual software device that can be networked with other containers to form a wider system. A perfect choice for a networked audio solution.

NDI 5, allows users to connect to any device, in any location, anywhere in the world via innovative new features including NDI Bridge and NDI Remote

NDI 5 – BaM Award® Winner

Produce more, save the planet, adopt remote

We chose to build VIP on a containerization platform called Docker and from a standing start in June 2020, by August we were demonstrating a beta VIP solution hosted on Amazon Web Services (AWS) to trusted partners.

The ongoing development of VIP from that point has been anything but plain sailing as we learned how to address the nuances of Cloud VPCs, understand Web security, rollout WebRTC and listened to customers widely varied productions requirements within a working environment that is new to all of us.

VIP has been 'shipping' since Q3 2021 and is deployed and running as a Cloud solution or On Prem using a Telos Alliance supplied bare metal server at locations around the globe.

In September 2021, Telos Alliance and Grass Valley announced a partnership to offer VIP as a native SaaS solution running on GV AMPP.

In an industry first, a fully featured virtual communications platform is a tightly integrated part of one of the most comprehensive Cloud Production systems on the market today. Equally, it can operate as a standalone Infinity Intercom solution, an add-on to an existing third party Comms system or as a hybrid.

Telos Alliance is proud to call Telos Infinity VIP, a BAM Award® Winner.

Suso Carrillo
Marketing Lead, NDI

One of the key takeaways from the past two years is that as an industry not only do we need to travel less, but we can travel less and still make excellent programming that wows audiences. Traditionally pandemics have few upsides, and Covid-19 has caused more than its fair share of upheaval and misery, but it arrived at an opportune time for those that had already been working hard in the background to implement more remote working throughout the industry.

Save on cost, save on carbon

The sustainability arguments for remote production have been rehearsed and debated for several years. Taking live sports OB as an example. The idea behind remote is that only the essential equipment is transported, the cameras, camera crews, microphones etc. Everything else, the switching equipment, slow motion, graphics and more, stays behind in a production hub. High quality 'raw' visual feeds from the stadium are sent via redundant links to the hub, which then switches cameras, adds commentary, and performs all the other myriad functions that used to be done in an OB truck.

It's quick, it's lean and crucially it's cost-effective. And since it became the only way to produce live sports in the era of lockdown restrictions and social distancing, it overcame any residual objections in the industry and became the standard method of production all the way up to Tier 1 events.

We also got to see precisely how beneficial it can be. In the UK, the albert sustainability initiative estimated there was a 66% drop in carbon emissions per hour of OB from May 2020 to April 2021. This, it reckoned was primarily due to a decrease in travel and accommodation emissions, which declined by 78% and 90% respectively. And that figure is only within sports.

We have seen new production models enthusiastically embraced across the industry. From newly distributed and hybrid working environments in post-production to studios which genuinely span across countries and even continents, there is an entire generation of companies that is

NDI 5, allows users to connect to any device, in any location, anywhere in the world via innovative new features including NDI Bridge and NDI Remote

starting to work in an increasingly sustainable manner.

We're increasingly giving them the tools to do it too. For example, the latest iteration of NDI®, NDI 5, allows users to connect to any device, in any location, anywhere in the world via innovative new features including NDI Bridge and NDI Remote.

Connecting the world through video, NDI

Since it was launched in 2015, NDI's ability to make connections to an IP network fast and find a device within a networked infrastructure easily has made it the de facto standard when it comes to constructing IP-based networks at the Local Area Network level. What NDI 5 brings to the table is the ability to extend that around the world and to Wide Area Networks.

NDI Bridge enables the hassle-free establishment of remote production workflows by forming a secure bridge between any NDI network regardless of location. Users can share NDI sources between remote sites, anywhere in the world, using a simple and secure network setup based on 256-bit encryption. This allows live production teams to stay native in NDI end-to-end, reducing complexity, cost, and latency across any distance. NDI Bridge delivers local convenience on a global scale as it handles all the complexity of remote sources, and still works with alpha channel, KVM, PTZs, tally, and much more.

NDI Remote, meanwhile, lets users contribute high-quality live audio and video to live productions simply via a URL distributed by the production team using any internet-connected device. This opens a limitless realm of possibilities for industry professionals by introducing content contributions from across the globe to live productions of any size, and without the need to be trailed around by extra equipment.

Moving toward a more sustainable future

All this combines to mean less need for shipping equipment and the people that run it from location to location around the world. That alone shrinks the carbon footprint enormously and moves the industry on significantly in its journey from carbon neutral to net zero. And there are other sustainable benefits that can be realized as well. By centralizing production, for example, the industry can maximize the uptime of its equipment by using it in multiple productions. A hub can easily produce two football matches in an afternoon and switch over to a live light entertainment show in the early evening. There's more to come here too.

The move towards virtualization and cloud-native workflows enabled by tools such as NDI Bridge holds the potential to bring footprints down even further alongside sustainable initiatives from the major cloud providers.

There are still challenges to be met. Net zero production is going to involve implementing innovation in many different parts of the production chain, but technologies such as NDI can play a key part in connecting people and equipment securely together wherever they are, making production not only more sustainable but more cost-effective too. And, as an industry, these factors are only going to grow in importance over the coming decade.

Quantiphi – BaM Award® Winner

Eliminating Hidden Content Storage Costs Through Artificial Intelligence

'Cutting Edge', 'next-gen', and 'innovative' are some of the usual prefixes accompanying everything AI-built and used by Industries today. But, very few organizations today get to utilize these new technologies without negotiating legacy issues.

Media & Entertainment is no exception here.

Any technology which can solve real and expensive problems has far-reaching benefits. But unearthing a costly problem that is worth the time and effort of technology experimentation is where AI adds value.

Currently, Media & Sports enterprises rely on the cloud for large-scale management and distribution of content. While a gradual transition from LTO storage to cloud infrastructure is underway, a large fraction (27%-37%) of content resides over on-prem servers. Furthermore, while fast migration to the cloud is necessary to streamline content management; cloud storage is expensive.

Hence, year after year, M&E enterprises incur significant data storage expenses on storing and migrating content between cloud and on-premise servers. But, significantly few realize that duplicate content is often responsible for 25-30% of the cost.

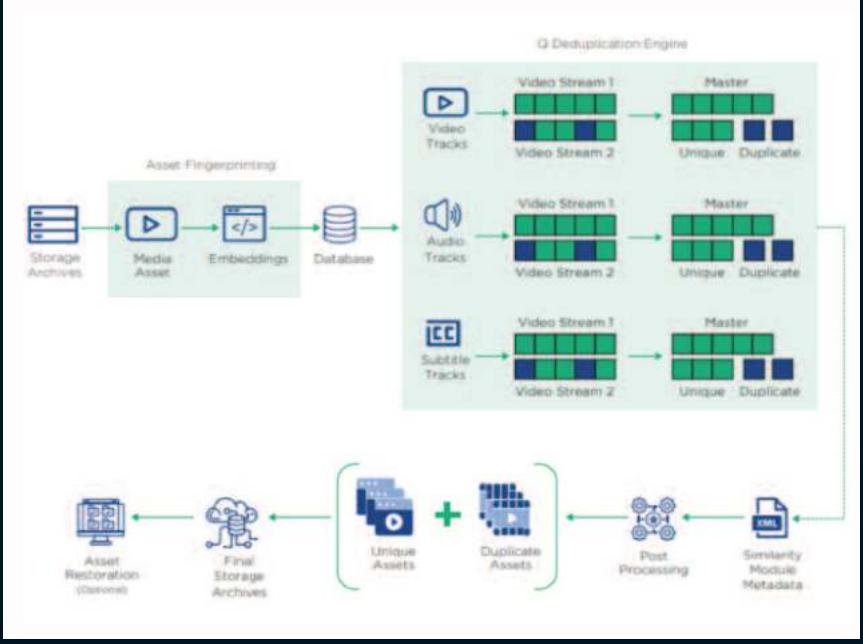
Considering that typical Media Enterprises have over 5 PB of content, unwarranted annual expenditure of duplicate content amounts to $200K. That means over a million dollars spent over nothing in 5 years.

What is causing these enormous volumes of Duplicate Content?

Over 50k content operations could happen within a month for mid-to-large media enterprises. Several versions of the same content get created due to post-production or editing operations. These operations are responsible for generating multiple duplicates, adding unwanted dollars to their storage expenses. These duplicates are created as a result of requirements for different aspect ratios or resolutions or different audio tracks for the same video asset; the presence of black frames, graphics, text, or other effects; and existing video asset subsets such as proxies and highlights (or clips) amongst other reasons, to facilitate compliance with regional requirements of distribution.

What makes this an AI Challenge?

As organizations grow and add more content and distribution streams, editorial operations also increase to meet compliance needs. Duplicate content versions result in media assets with the same metadata. Metadata tagging of content has become the norm over the years rather than an exception for media organizations to facilitate search



simplicity. But, duplicate content renders this process moot as it significantly increases the time to find the relevant content.

Furthermore, reducing costs and providing more effective backup processes are the guiding principles of deduplication solutions; it needs to work seamlessly with existing media asset management (MAM) systems to facilitate minimal changes in day-to-day operations.

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How do we solve it?

We noticed pretty early in our journey an increasing trend of content duplication (in the cloud) for many of our customers. Recognizing the same/similar assets was not humanly possible as customers had thousands of them.
Our belief was that if we could help customers identify the volume of duplicate content, we could help them reduce operational costs.

Keeping the above in mind, we built our AI-based video deduplication solution.

Our Award-winning solution deduplication analyzes each and every frame of the content. It then assigns a duplication score between the assets. For the highest accuracy, the solution uses video and audio similarity technology to compare individual frames of different assets and provides a duplication score with a confidence level between the assets.

Over time, we have enhanced our ML models to identify minor differences in content, such as the presence of a network logo in the corner of the frame. Additionally, through multiple customer engagements, we have optimized our solution to be cost-effective and secure as our customers scale. We also developed an intuitive UI interface that showcases the end result as individual files and duplicate videos mapped to parent assets with a report of % duplication and the nature of repetition.

The solution scans through the storage archives and generates fingerprints for video and audio tracks of every asset. These fingerprints help the AI engine understand the content present in a frame/audio track and help identify the duplicates.

The bigger picture

Why should Organizations with exhaustive content operations try a Proof Of Concept (POC) with AI-powered Deduplication? First, This is a valuable technology in a world with increasing data storage. With the vast content movement to the cloud, this is a vital tool in managing wastage storage costs.

Second and most importantly, M&E Enterprises have their content libraries built over time, in different systems and for multiple purposes. The sheer ability of AI to tell what is similar and related across this sea of content has untold benefits. You will be surprised with what you can find within your content archives and then ideate other downstream applications, which video similarities can unearth for you.

Authors

Abhishek Bishayee
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Prominent features:

IABM AT NAB SHOW 2022

BaMZone™

N116/117 LMR

- **Exclusive BaMZone™ Member Lounge**
- **IABM TV Studio**
- **IABM State of the Industry Conference** – Sunday
- **BaM Live!** – Monday-Tuesday
- **Dell Talks** – Monday-Tuesday
- **The BaMZone™ Happy Hour** from 5pm Sunday-Tuesday

iabm

Transcription

Automated Transcription and localization with a human touch can transform your media operation

Russell Vijayan
Head of AI Products and Services at Digital Nirvana

Enterprises and media companies rely on transcripts to create a written record of movies, TV shows, meetings, speeches, phone calls, newscasts, training videos, and more, thereby making the content searchable, discoverable, and accessible for internal and external uses. And they need only translate the transcripts to reach people in different parts of the world who speak different languages. Content localization has become more important since the start of the pandemic as more and more companies reach across continents.

But for the vast majority of these companies, transcription is not their core business. Transcribing the content and translating it to multiple languages in-house is an administrative hassle that takes time and energy away from what they really need to accomplish.

Either they have to implement the technology and find, hire, and manage a team of qualified people to handle the process themselves, or they must allot staff to find, hire, and manage transcription/translation providers. That requires multiple personnel to assign jobs to vendors based on capacity and to monitor incoming transcription files for on-time arrival. It also means running a full quality-check operation to make sure transcriptions and translations meet standards for accuracy, style, and compliance, especially with specialized topics.

Sometimes transcripts must be integrated with the audio or video in several output formats. In that case, there is an engineering requirement. Either they have to hire a development company to do this, or they have to use internal engineering resources to build something that can create a transcript and then convert it into different formats.

Some companies, such as news broadcasters, have multiple, continuous feeds coming in at a time that must be transcribed and translated in real time. Others, such as movie studios, require transcripts for stored content. Still others, such as financial data providers, have peaks and valleys in their transcription/translation needs.

... companies are using turnkey transcription and translation services built for scalability to handle the real-time transcription function from beginning to end

Accounting for that demand is another challenge, especially when outsourcing. It's hard to keep freelancers or small-scale vendors busy during slow times, and many vendors don't have the capacity to ramp up quickly during an onslaught.

Enter AI-driven transcription and translation services paired with human experts.

A solution like this relies on dedicated language and content specialists. This team, aided by cloud-based technology, generates highly accurate transcripts, captions, and text translations within tight turnaround times.

It works like this:

Companies initiate the process by transferring a video or audio file through multiple data transfer options including a portal, API integration to existing workflows, MAM, PAM, or even a file sharing platform with a request to transcribe and localize. For example, let's say the source audio is in English, and the request is to provide transcripts in English, Latin Spanish, and French.

From there the automated system will ingest the file and use speech to text and natural language processing to generate an English transcript. After the speech-to-text generation, there are two layers of manual quality checks to make sure everything is 100% accurate. The system has pre-set rules and NLP algorithms which are used to convert them to closed captions. Once that is done, the entire transcript goes through an automatic machine translation process, and then it goes through another two layers of QC by humans – one by a language expert and another by an in-country language specialist in Latin Spanish. The same process happens simultaneously in French.

A solution like this relies on dedicated language and content specialists. This team, aided by cloud-based technology, generates highly accurate transcripts, captions, and text translations within tight turnaround times.

Before creating the final output, the system performs an automatic process to check for crucial elements, such as style conformance and missing information. If there is any issue, the system will alert and make it impossible to upload transcripts back to the client's portal until a supervisor has reviewed and approved the output. The system automatically generates the output in all required formats and delivers it back to the company's portal.

Post-delivery auditing – whereby an auditing team evaluates a percentage of all delivered files based on various parameters – helps to ensure the system and quality continuously improve.

This solution delivers:

- **Consistent quality** – Multiple levels of automated and manual QC ensure all boxes are ticked before the final output reaches the customer.
- **Reliability** – A global presence, coupled with technological innovations, keeps the operation running 24/7 to meet uninterrupted service deliveries.
- **Ability to ramp up** – The entire operation is set up to handle peaks and valleys in terms of the amount of data to be delivered.
- **Localization with pinpoint accuracy** – In-country translators catch slang terms, nuances, and the essence of the message that speech to text and even other humans could miss.

Gone are the days of building in-house transcription capabilities from the ground up or managing multiple vendors. Instead, many companies are using turnkey transcription and translation services built for scalability to handle the real-time transcription function from beginning to end.

Case in Point

One example is a global company that aggregates the expertise of professionals around the world in a variety of industries. Private equity, investment funds, management consultancies, corporations, and nonprofits rely on this information to help make better decisions.

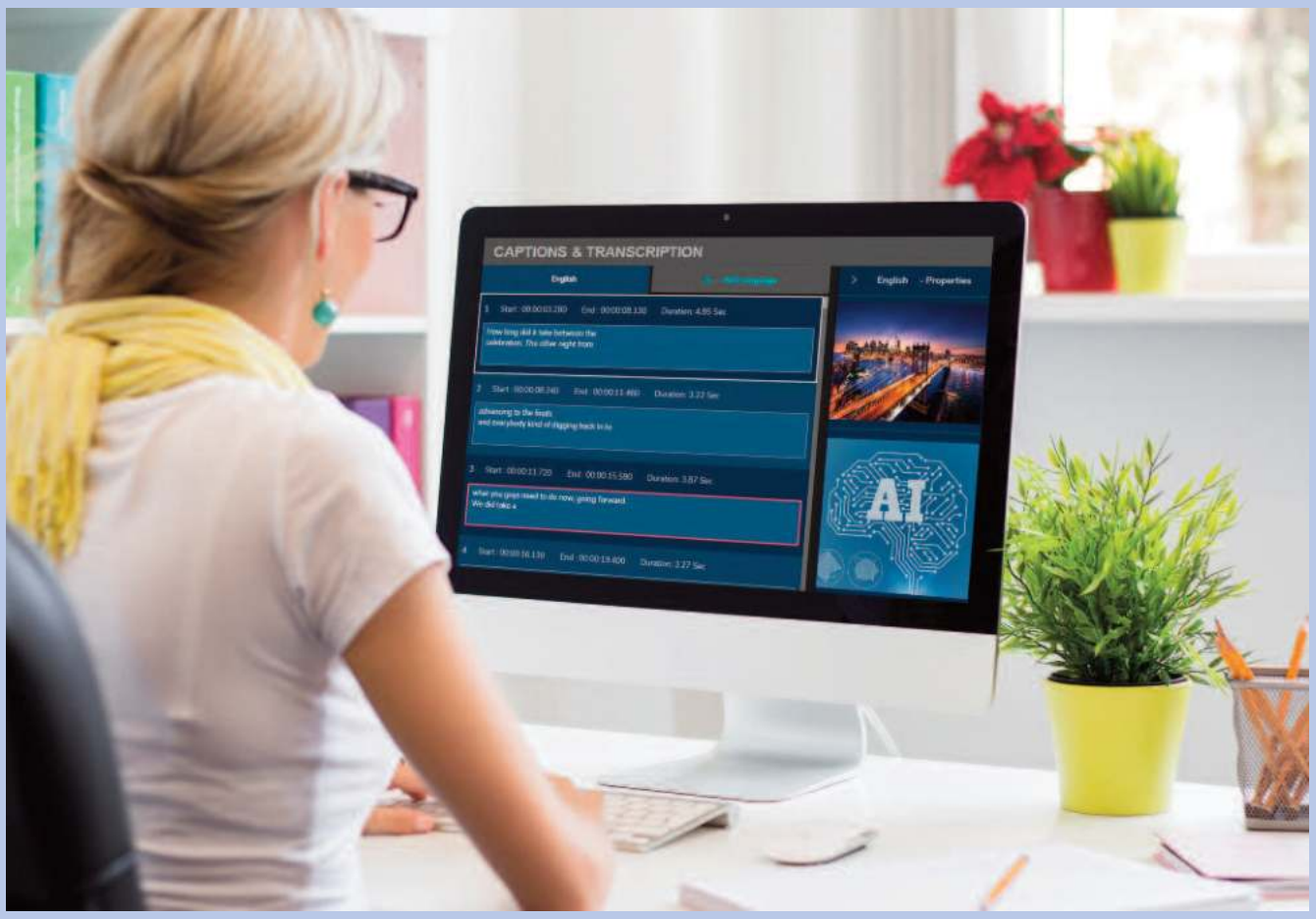
At any given time, there could be several industry-specific discussions happening with different experts from different viewpoints and in different geographies across the globe – which require transcription and localization before the company can put them to use. The company's algorithms derive insights from those transcripts. Also, in the end, the company includes the transcript in desired languages in the package that goes to its subscribers so that they can take elements from it for things like research reports or to mine additional insights.

This company tried starting an in-house team on its own but got bogged down by the administrative complexity of hiring, management, and quality control. It required a large team to oversee multiple freelancers and small-scale vendors – a team that spent a lot of time following up with freelancers and vendors that hadn't delivered on time. It was tough to find vendors that could handle spikes in volume as well as the capability to localize into different languages. Even worse, sometimes freelancers or vendors would opt out mid-project because of difficult audio or complexities involved in localizing. Because of these delays, the company was missing time commitments to its customers.

Results

After implementing the turnkey solution, this global insight provider's transcription operation was transformed.

- It greatly reduced the number of administrators and time required to deal with transcription.
- It eliminated the need for multiple vendors.
- It helped transcribing in 30 different languages and localize all to one common language for insight generation.
- It scales up and down to handle fluctuations in volume with no loss of quality.
- It consistently delivers accurate transcripts well within the company's turnaround times, even during peak periods, so the company can meet its customer commitments.
- It delivers accuracy the company can trust without performing its own quality checks, saving time and effort.



Creative Collaboration

Special Report

CREATIVE COLLABORATION

The rapid transformation of both technology and business models in the Broadcast and Media industry means that suppliers and users of technology must collaborate ever more closely to keep ahead of the fast-changing landscape and continue to succeed.

This Creative Collaboration special feature illustrates just some of the many ways vendors and end-users are working together to solve problems in partnership, moving decisively away from the transactional business model that used to dominate the industry.

BITCENTRAL:
Efficient Media Workflows and Working Together

Sam Peterson
COO, Bitcentral

In any creative industry, working closely and sharing ideas with a team is vital. The broadcast journalism space is no exception, with collaboration at the very heart of day-to-day work. The pandemic has accelerated the need for collaborative tools to support this approach and companies need to ensure they have adequate and robust solutions to keep up with the increased demand.

Broadcasters face the challenge of successfully managing remote work using Media Asset Management software (MAM) and effective communication with teams quickly and efficiently regardless of location.

I have no doubt that broadcasters can overcome these challenges and pave the way for new and exciting opportunities. However, it will require hosts to be ready to embrace the exciting new changes in the industry.

Bitcentral has been at the forefront of the evolution of the media landscape for over two decades now. With a focus on product development, often in close partnership with customers, the company has worked tirelessly to ensure that broadcasters have the most efficient media workflow solutions available. We're providing the platform for successful collaboration, discovery, and content contribution with tools for editing and repurposing content to ensure long-term success in today's highly competitive market.

MAM solutions that work

Broadcasters need to ensure that they are successfully delivering news at the click of a button. With information constantly available, having the right media asset management software can help them share stories with other stations and markets from multiple devices and locations.

Oasis is Bitcentral's MAM, sharing, and archiving solution that enables broadcasters and their teams to deliver video, images, scripts, and other metadata efficiently from remote locations – perfect for addressing the challenges of working remotely.

To help support collaboration for news production and archiving, Oasis has field-centric tools that connect remote teams directly with the news studio. As a result, operators benefit from being able to push stories quicker, whether on-air or to social media and digital outlets.

For journalists out in the field or working remotely, Oasis enables them to download clips and upload edited packages to the newsroom efficiently and securely. Journalists can contribute from laptops, tablets, and mobile devices via a secure managed file transfer system to overcome any weak or interference-ridden mobile internet connections.

Maximizing value

The processes for successful collaborations across distances should be essential to a company's business strategy. It requires a comprehensive, reliable, and highly streamlined process to help with time-saving and be cost-effective. Broadcasters need to ensure the system they have in place is accessible, easy to use, and robust to tackle vast amounts of workload.

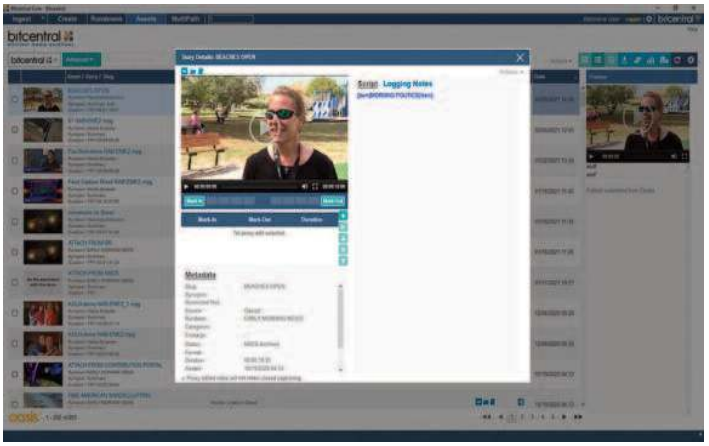
Bitcentral's Create is a demonstration of enhancing the collaborative production for companies across the media supply chain, including broadcasters, corporations, and other organizations collaborating on video projects.

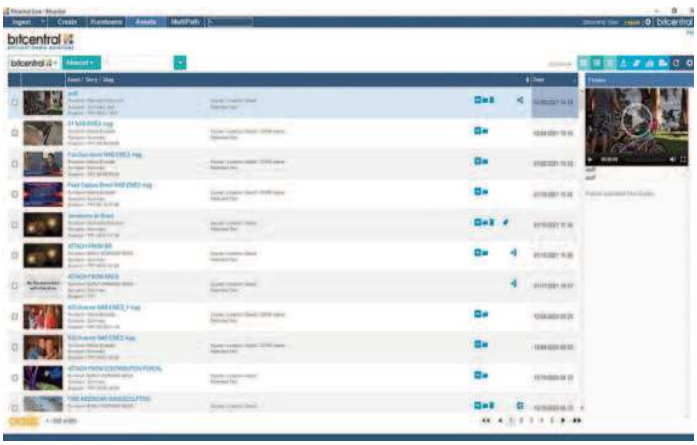
Create is a browser-based, timeline editor designed to produce high-quality video content quickly and efficiently. Operators can use Create to log, proxy edit, and publish edited videos to various platforms in the most efficient manner, enabling greater visibility and efficiency.

Create enables both in-house and remote staff to produce compelling stories in minutes and publish them due to its flexibility and editing features.

Users are given the added benefit of saving time – essential in today's constant news consumption world – by being able to easily version source files as soon as they arrive and ingest/export content at scale. Create's timecode-based logging of both live and file-based sources directly from the timeline provides the perfect infrastructure for users to distribute videos via Bitcentral's Multipath to OTT, social media, syndication, and direct internal connections to MOS integrated newsroom computer systems.

Reliable and fast production tools are critical as the industry enters a new phase of working in which broadcast teams are spread across multiple locations. Working together as an effective team is the key to success, and with Bitcentral's suite of products, the industry is well-prepared.





Cerberus Tech:
Collaborating on Hybrid Workflows to meet Content Demand

Chris Clarke
CEO,
Cerberus Tech

There have been two key factors which have accelerated the move away from linear TV towards digital platforms. The first is the explosion of on-demand access. Consumers now expect to dictate schedules and watch their favourite content whenever they want, fitting their viewing around their lifestyle. The other has been an increase in variety, with audiences expecting a wider choice of content types and formats.

Both factors have had an impact on the overall volume of content needing to be created but have also ramped-up the emergence of new genre-defining forms of entertainment. So, with all this content flooding our screens, it is clear that the way consumers engage with video has been altered forever.

Content creators have been pushed to match viewers' expectations. Audiences are looking for seamless entertainment experiences that move them from one thing to the next, without friction. Platforms don't just need to mirror consumers' taste on a surface level, but also take them beyond what they were originally searching for, allowing them to discover something new.

Shifting Consumption Trends

Recent insights from Forbes highlight how crowded the video subscription market is becoming. *"The average U.S. consumer now pays for four different streaming video subscriptions. Nearly one-quarter of U.S. consumers (23%) have added at least one new paid streaming video service since the pandemic began."*

But broadcasters and content owners aren't just competing with like-for-like platforms anymore. They are competing for viewers' attention across a whole landscape of digital products and services. The result is a high-stakes attention economy, where only the innovative will survive.

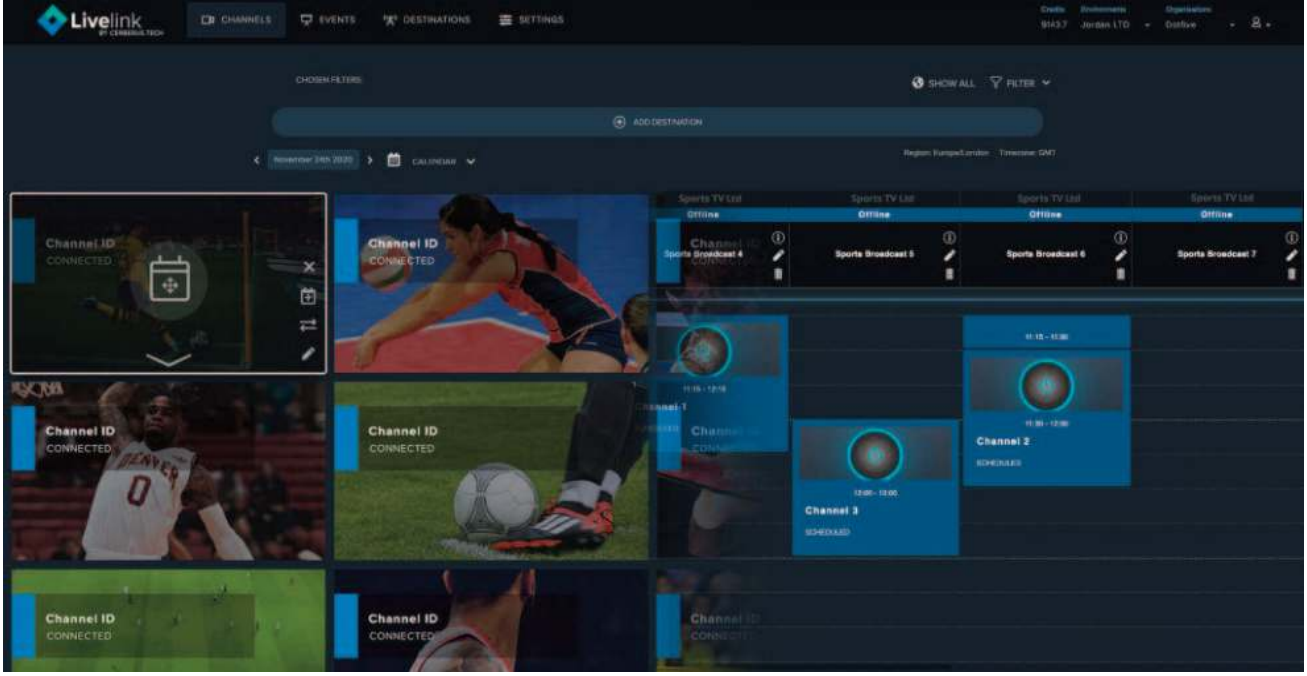
While audiences are moving away from a loyalty mindset, they are prepared to make a financial commitment to quality content. Just prior to the outbreak of the pandemic, Neilson Sports highlighted that the next generation of sports fans won't fit into a traditional mould. *"Our research shows GenZ consumers are not averse to paying for premium content, but they are increasingly expecting a tailored value proposition – that is, they want to be able to pay purely for what they want, where and when, and without any long-term contractual commitment."*

A Change in Outlook

The impact of increased variety on the success of entertainment and social platforms cannot be overstated. It is no longer enough to lay on a limited menu of options for audiences, with a 'take it or leave it approach'. So, when it comes to live events, sporting events in particular, why is it that some broadcasters and content owners are lagging behind the curve?

The mindset for live sports still feels very linear – the match starts at this time, and it ends at this time, and the main event is book-ended with some commentary and analysis. This is a world away from the immersive potential that live sports offer and feels like a missed opportunity. By increasing the number of feeds distributed from a live event, content owners open a host of viewing format options, which can be packaged for different markets. By diversifying offerings with behind-the-scenes footage, finding new angles on build-up and follow-up coverage and developing VIP event experiences, content owners can grow audience engagement and explore new revenue opportunities.

But while consumers are clearly open to change, content owners seem less prepared to transition. The challenges of moving feeds around the globe are significant and the traditional workflows of satellite and fibre have remained the go-to for many content owners. But there may be room for innovation and a move towards more collaboration.



Broadcasting Restrictions

In many cases, there is a clear reason for a lack of supplementary content to support and enhance live sports events and expand viewing options. Until recently, the downstream cost profile of delivering live content was often prohibitively expensive for all but tier one sports. Therefore, booking additional satellite transponder space for multiple feeds was completely out of reach financially for many content owners. Also depending on the scale of the broadcast operation, content owners would need sizable infrastructure in place to be able to send, receive and process satellite signals.

Not only does satellite's cost-prohibitive nature become challenging for content owners looking to diversify offerings, broadcasters in global territories can also experience barriers relating to operating in a region that sits outside the standard satellite footprint. In these cases, the value of the content can be overshadowed by the cost of the technical fees the taker needs to commit to. This means that even high-profile events don't always get the right exposure in new regions which could be highly beneficial for engagement.

Hybrid Opportunities

So how can broadcasters and content owners respond to the seemingly insatiable interest in fresh content, whilst managing the costs and infrastructure challenges associated with delivering live video?

New developments in IP delivery mean that broadcast-grade feeds can be moved from any location to any destination, at a significantly lower cost than with traditional methods. Content owners can now transport live linear and OTT content from point-to-point or point to multipoint, with the option of self-serve or fully managed content services.

The availability of IP means it is ideally positioned to respond to an increase in the overall demand for live sports content. Until recently the ability to decouple responsibility for sending and receiving content had been the missing piece of the puzzle. But IP can now scale up to large and complex operations with ease. In addition, there is the potential to maximise reach using established teleport services in geographically diverse regions; combining IP and satellite infrastructure to offer the best of both worlds.

Using the right combination of broadcast-grade tools will allow content owners to diversify and monetise their offering. Content owners can assess the commercial value of different feeds for a live event and decide on the best delivery method for their requirements. Perhaps using satellite for the main 'world' feed but then utilising the agility of IP for multiple supplementary feeds, in order to help meet content demand.

The Next Step

With audiences adapting their viewing habits and favouring more agile and customisable methods, content owners need to retain their interest. As with other consumer supply and demand patterns, video content production must satisfy the needs and scale of consumption. While the platforms for consumption have changed significantly in recent years, the widespread means of delivery hasn't altered as much – that needs to change.

Rather than unnecessarily limiting audience reach, and missing the opportunity to expand into new territories, content owners can utilise hybrid workflows across a CDN 2.0. Embracing a new collaborative era of content delivery, as well as championing holistic live experiences for fans.

Grabyo:
Collaboration in the cloud: The next leap forward for live video production

Scott Lunn
Head of Content, Grabyo

We're living in a time of seismic change across the broadcast and media industry. The rise of OTT, the dominance of social media platforms and the advancement of cloud technology have transformed the landscape into an almost unrecognizable state than that of a decade ago.

With so many new platforms to choose from, consumers are watching video across more screens and channels than ever before. For media organizations, this has presented both challenges and opportunities.

The foremost challenge is keeping up with consumer demand – winning, and keeping, the attention of your audience. To do this, today you must execute a comprehensive multi-platform video content strategy that spans almost every medium and format available.

But how? First, you must look to your supply chain and video production workflows.

These must be designed to harness all of your available resources and manpower to collaboratively create quality video content at scale, and in a timely manner.

Fostering true collaboration

Traditional video production hardware and software can limit you in this task. Firstly – in order to collaborate effectively you'll need to have invested in an expensive production studio, equipped with lots of highly trained personnel using hardware with a limited shelf life. Even when you're all set up, distributing video across multiple digital, social and broadcast platforms requires you to replicate workflows and create managed archives with more equipment and personnel. Instead of allowing production teams to focus on what they do best, they are often waiting to receive assets from further up the supply chain to edit and re-format for distribution.

This workflow is also difficult and expensive to scale; you'll always need more physical space, more equipment, and more people with more training.

This is where the cloud comes in. Companies like Grabyo are building truly collaborative workflows that streamline the entire end-to-end process and help production teams do even more with less.

The key to collaboration is flexibility. Producing content requires your team to have access to everything they need at the right time and place.

Grabyo's cloud-native platform enables anyone, using just a web browser, to access their live video feeds, VOD assets, graphics and their archive to produce live and real-time video content from anywhere in the world, at any time. Instead of replicating workflows, you are able to deliver video content to multiple channels and platforms simultaneously.

The truly collaborative nature of the cloud enables all production roles – from technical directors, to graphics operators, A1s, marketers, remote guest contributors and beyond, to be in the same virtual studio at the same time, even from opposite sides of the globe if necessary.

Video production workflows hosted in the cloud work slightly differently when it comes to scaling – instead of adding new hardware or software, you are able to 'spin up' a new production environment in the cloud, like opening a new virtual studio, which is accessible from anywhere almost instantly.

All of the heavy lifting is done behind the scenes – in Grabyo's case, in the cloud servers of Amazon Web Services (AWS) – so the weight of video processing, rendering and distribution is taken away from a local machine. This is designed to enable remote and decentralized production workflows, further untethering production teams from the studio.

Modern production technology like Grabyo's also follows the industry trend of being focused on the user experience. Ease of use has become a necessity, as it removes those restrictions for finding a production crew with years of training, while opening up opportunities to collaborate with talented producers all over the world.

Lessons from the pandemic

While it is well-worn ground, the impact of the global COVID-19 pandemic was a litmus test for all video production workflows, asking questions of reliability and flexibility. The lessons will not soon be forgotten.

When teams were denied access to studios or offices, collaborative working for many was reduced greatly. Many turned to the cloud to fill those gaps – be it fully virtual cloud production, or remote access software.

Those using cloud-native platforms such as Grabyo were unaffected – these production environments are accessible anywhere using just a laptop/PC, and could easily be scaled to service any new requirements. With no live events taking place, these organizations were able to quickly build and experiment with new live shows, without using any additional resources. This flexibility brought about new formats and video content that continues to engage audiences to date.

Installing new remote access software did enable organizations to keep content on-air, but in the long-term, they do not allow companies to scale their production supply chains as seamlessly as solutions built in the cloud, due to their dependence on local hardware and software.

Decentralizing production and the future

The 2022 NAB Show will be a marked occasion, not just because we are able to return to the Las Vegas Convention Centre after a two-year hiatus, but because we will get a sneak preview of what is to come. This year's NAB will mark a significant step in Grabyo's mission to build a decentralized, fully-fledged broadcast production system in the cloud.

At booth W3500, Grabyo will be showcasing the latest advancements it has made to its live production platform, including the ability for users to produce end-to-end broadcast-grade live video, in SRT and Zixi format.

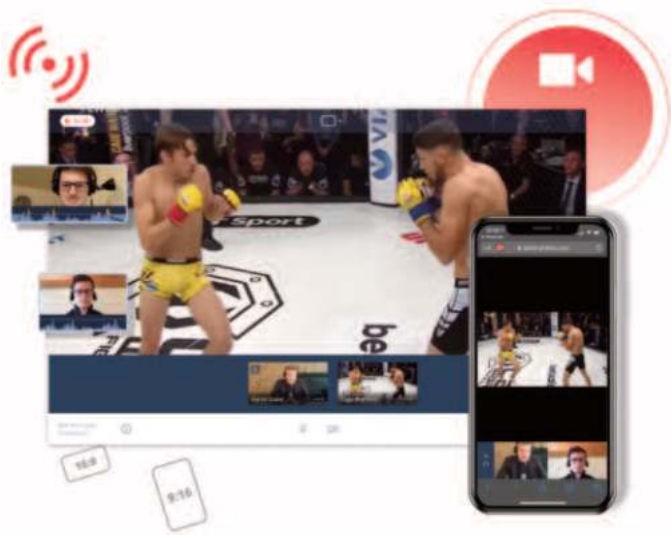
Grabyo was one of the first companies to build a robust digital and social video production platform. Its live clipping and publishing service has led the market for

many years and it has strong partnerships with the likes of YouTube, Facebook, Twitter, Twitch and Snapchat. In 2022 it partnered with Instagram and TikTok to add to its native distribution tools, having been selected in an exclusive group to launch TikTok's Video API.

Boasting major clients such as UFC, Univision, The Television Academy, Arizona Cardinals and FOX Sports, Grabyo's disruptive technology has laid the foundation for collaborative live video production in cloud, and is used by a number of distributed teams across the world, who are delivering localized real-time and live video content to multiple markets.

Its mission to bring the full functionality of traditional production hardware to the cloud is not an easy one – it will be the first cloud-native platform to offer end-to-end production and distribution to broadcast, digital and social platforms and remains committed to delivering on this vision.

Truly decentralized production will bring new levels of reliability, creativity and collaboration to video workflows. It's the next big leap for video production that will revolutionize the broadcast and media industry once again.



Creative Collaboration

LiveU:
UK's Live + Wild 5G project takes technologies to the limit

Malcolm Harland
UK Country Manager, LiveU

The 18-month Live + Wild project recently completed its fifth and final 5G transportable mobile network test at yet another extreme UK location. LiveU has been a commercial partner throughout the DCMS (Department of Media, Culture and Sport) part-funded project, which won funding from the department as part of the 5G Create program: "5G Create is an open competition within the 5G Testbeds and Trials Programme. Up to £30 million of government funding will be available, aiming to explore and develop new use-cases and 5G technical capabilities." There have been multiple programs across many verticals.

'Live + Wild' is a consortium led by multi award-winning Candour Productions, based in Leeds. Partnering with Candour is a telecoms innovation company aql, who's also powering many global brands, and additionally, MTN Safety who has been supporting the team in extreme environments. This collaboration was born through an opportunity created to test how 5G can help filmmakers deliver live and fast turnaround video content from remote, challenging locations.

Patricia Doherty, Producer Director, Candour Productions and Live + Wild Project Director, said, "I heard about 5G's potential and the funding window when I was researching a different film. This was a very fast turnaround documentary, right at the start of the first lockdown. It was called A Day in the Life of Coronavirus Britain and had to be filmed, edited and onscreen within three days. I spoke to UK5G advisor Paul Wilson who informed me about the funding window and we discussed the increased bandwidth and lower latency of 5G and how that could potentially benefit Candour while filming fast-turnaround documentaries when we need to get footage very quickly back to the edit. We were filming all over the UK and the biggest challenge was getting that footage where it needed to be. We came at Live + Wild from a film maker's perspective as a potential user. We wanted to explore what 5G can do for us as filmmakers and this fitted the criteria for the DCMS bid, which was the creative industries vertical."

Candour approached 5G mobile operator aql with the idea, which they jumped at. aql, it turns out, is powering four other DCMS 5G Create projects.

Professor Adam Beaumont, Chairman and Founder of aql, stated "For us, this 5G Create project embodied both 5G-enabled creativity and also the creativity with the technology itself. Normally, mobile networks are optimised for fast downloads, with the upload being much slower. In this instance, we optimised our network to allow fast upload of live streams from the cameras. This is a key differential to being able to support filming and high-resolution content creation over 5G. Using our dedicated networks also means that it's possible to film large spectator events without fighting with the spectators for scarce mobile bandwidth where everyone is connected to the same network." He continued, "Now we've created a simple-to-deploy mobile platform as part of an all-terrain vehicle, we're going to look at how we can convert this to an all-electric platform and also a smaller 'network in a box' solution. All built using UK or European supply chain."

Live + Wild consisted of five separate trials: an initial test event sea cliff climbing; covering the Helvellyn Triathlon; the Dark Sky trial at the Kielder Observatory; cave exploring around Settle, Yorkshire; and sea kayaking. From each trial there was a very high-quality live stream, a documentary and an overall "making of" film being created. Doherty explained they were testing both the live streaming capabilities, taking into account the very high-

quality, bandwidth-intensive footage requirements, as well as how very large files could be sent. As she said, "We've used our crafted storytelling skills to try and create more documentary-style footage but live streamed. That was a tall order, but we learned a lot in the process."

Doherty continued, "The tests were chosen to be very different from one another. Some of the areas I had previously visited whilst climbing and caving – the sea cliffs and Ribblesdale's caving system particularly. I wanted to make this hard for us to give 5G a real workout. We worked closely with aql at the outset and they provided me with bullet points about using 5G, what it likes, what it doesn't and how we could deliberately create different, challenging scenarios. It was also scheduled across 12 months so we'd also experience massive variations in weather."

aql's portable 5G off-road, vehicle-based network technology can be set up in a matter of hours, courtesy in no small part to what has been learnt via using it in such testing conditions. Range varies, with up to several miles possible depending on location, with the high-end cameras used during these shoots connected to a variety of LiveU units, including the multi-camera LU800. Live + Wild used remote production for four of the events – carried out in Leeds at aql's historic and well-connected HQs, with a small on-site team and gallery producing the Dark Sky event from Kielder. For the remote productions, signals were bonded at the 5G base station and then a variety of backhaul links were used to get the streaming back to base, often using several per event. This included mobile LTE '4G' and Low Earth Orbit (LEO) satellite connectivity as well as fixed-line broadband.

Upesh Chavda, Senior Technical Operations Engineer, aql, explained the vital nature of IP bonding to the project, "Based on our experience at the sea cliffs event in Wales, our first event, it was approximately 5:30 in the evening that we started having issues with the mobile networks in terms of their signal because we were in such a remote area. By using IP bonding we kept the connection stable and resilient. We had some of our backhaul networks drop out and bandwidth drop significantly, but because of our consistently stable 5G connection to the LiveU, and the bonded backhaul, we could make it work. Essentially, we were using a VPN over multiple backhaul networks, to our distributed Mobile Core, keeping the signal consistent, which is critical for live events."

Andy Brown, VP 5G Delivery at aql added "One of the biggest learnings has been that we (aql) can set up a 5G network rapidly in places where there's currently little to no connectivity and we now understand how we can support the media industry. The insights we've gained from this are significant. To be able to see the creative output of our technical endeavours has been highly rewarding. We'll be working with LiveU on other projects."

Bill Brigden, aql's CTO, commented "What's remarkable is, whilst we've had to do a huge amount of work to ensure compatibility with many of the remote devices with our network, the LiveU products simply connected and worked flawlessly, using a single 5G SIM and achieving huge upload speeds."

Doherty concluded, "We're really happy with LiveU. We hadn't used it before and it was great and very, very important to Live + Wild. It was clear from early conversations LiveU technology had to be in the workflow. And speaking with the company, it very quickly became clear the level of collaboration they were willing to commit to. It was very user-friendly in terms of the simplicity of setting it up and using it. We used a variety of units, including the multi-camera LU800 and the LU600 and compact LU300. It's great there's that range because sometimes you need to use a very small unit whereas other times the multi-camera capabilities of the LU800 took centre stage. At the triathlon, a member of our team had an LU300 on his bike for the 39-mile cycle stage and he didn't mind at all. We had multiple feeds at this event. We put a unit in a fixed position nearly at the top of Helvellyn and with the lens we used, w got a rock-solid almost 360-degree view of a large section of the fell run."

LiveU has been involved in many 5G trials, covering different aspects, around the world, including at an EU level. Live + Wild, and what we've all learnt from that, is a significant addition to our knowledge bank and further validation of all the work we have done across 5G and beyond.

NDI:
Connecting the World through Video

Since it was first launched in 2015, NDI has enabled people to work creatively in the increasingly IP-based workflows that dominate the industry with ease. Designed from the outset as a royalty-free software standard, it provides a protocol for IP transmission and live production using standard Local Area Networks (LAN), enabling users to quickly put together networks of connected devices at high-quality broadcast standards.

It enables audio and video-compatible products to communicate, deliver, and receive video over a computer network in a low-latency, frame accurate manner, bringing a plug and play sensibility to all sorts of creative workflows. These can include anything from switching in a live production environment to, with the addition of NDI Bridge last year that allows the protocol to operate over a Wide Area Network (WAN), collaborating on creative projects across countries and even continents.

Moving video from Montreal

This was one facet of the way that Moment Factory, a Montreal-based multimedia studio, used NDI when it was working on a multimedia experience for AT&T and global architecture firm Gensler to be installed in downtown Dallas, Texas.

A 31.7 meter, 6K resolution, Media Wall is the focal point of the AT&T Discovery District, displaying real-time data over 18 million pixels and 864 square meters to blur the line between the physical and digital world. As NDI is source agnostic, the technology allows Moment Factory to combine generative content capsules from any real-time engine while providing a visually seamless experience for the spectator. NDI Bridge also enabled people to collaborate effectively over an IP network even when they cannot travel to a project site for reasons such as scheduling, budget, or as was the case here, a pandemic. The whole project ended up being delivered with just one person on-site in Dallas, 1,700 miles away from the base.

Enabling streaming from Singapore

NDI also enables organisations to take advantage of streaming content opportunities in new ways. In Singapore, iFAST Corporation, a wealth management fintech platform, was also affected by the pandemic and found itself with a large conference and training room at the heart of its headquarters that simple wasn't being used. It decided therefore to turn it into a high-end TV studio and production facility for its own B2B streaming operation, iFAST TV. Working with APAC technology integrator Ideal Systems, it has turned the space into a state-of-the-art 150sqm (about half the area of a tennis court) IP-based end-to-end 4K studio that provides broadcast-quality content while being optimised to be operated by non-broadcast professionals.

Again, NDI is key to the success of the new facility. The studio is based around a TriCaster 2 Elite, which includes multiple functions including providing virtual sets. Into this are hooked a mix of cameras via NDI, either NDI-native PTZ cameras or camcorders running BirdDog NDI converters. These are all run using standard ethernet cables which, as they use PoE (Power over Ethernet) as well, further reduces cabling and studio clutter. Indeed, each cable for the PTZ units is effectively a 5-in-1 cable providing power, control, tally, video, and audio.

Impressively, there is no legacy SDI equipment or cabling in the entire facility, a feat which was only possible thanks to the deployment of the world's first NDI-native teleprompter and the world's first NDI-native studio monitors from Telescript.

This is very much the shape of things to come as the transition to IP gathers momentum and legacy technologies are jettisoned across the broadcast and associated industries. This is all being accelerated by the move towards cloud-based workflows, and NDI is instrumental here as well.

Making 5G mobile content with Sky Germany
In November last year, Sky Germany, in collaboration with O2, presented the top match in the Liqui Moly

Handball Bundesliga between SG Flensburg-Handewitt and Füchse Berlin via O2's high-end 5G network this week. Even more impressively, the production was executed fully in the cloud with Vizrt's Live Production Solution covering switching, graphics, and sports analysis tools all deployed in AWS. The workflow was made possible by NDI Bridge, which enabled the team to bring the programme feed from the cloud back to Sky HQ in Munich.

The workflow included a mixture of broadcast and mobile phone cameras, that used a deliberately simple 5G transmission path (powered by LiveU) to move the action from the stadium into the cloud. In the cloud, the NDI-enabled Vizrt solutions worked seamlessly with LiveU, ensuring that the production was near zero latency, scalable, and featured exactly the kind of enhanced quality that enables broadcasters to make the game come ever more alive for audiences.

At its heart, NDI enables the movement of video, audio, and data across any network, whether that be global, wireless, mobile, or local, and between cameras, mobile devices, production equipment or desktop machines. But it also does a lot more than that. It unlocks the ability to collaborate around the world, it helps bring broadcast quality video to a whole new market, and it enables successful and cost-effective native cloud workflows. In other words, it enables more people to create more content in the way that suits them than ever before, no matter where they are in the world.

Skyline: Collaboration – a Key Aspect for Any Digital Transformation

We live in exceptional times that offer us almost unlimited possibilities and opportunities, but these also come with plenty of entirely new challenges. The unexpected will be inevitable in our fast-paced future, and each ICT media company and broadband service provider needs to be ready to deal with this. This means that every company should go through a digital transformation process to make sure it can be successful in a data-driven future.

The digital transformation establishes the ability to change and evolve the company's business continuously and ensures that the organization can easily and continuously transform its products and services. The essential challenge this boils down to is the creation of an agile and DevOps-oriented powerhouse.

However, digital transformation is not just about simply deploying new transformational technology. Technology only enables digital transformation. The latter remains a very complex and multi-faceted challenge for any organization. The key to success is empowering not only your own employees and DevOps teams but also people outside of your organization to get easy access to all the data they need to build, test, deploy, and operate applications and services at high velocity and to continuously optimize, evolve, and improve those products at a fast pace.

At the core of this is the need for the **capability to collaborate**. It is essential that there is easy collaboration between organizations, and between a company and the consumers of its services. At the same time, every technology platform also needs the ability to make secure and fast connections with other platforms, irrespective of the API or underlying technology.

Let's have a look at some practical examples of how Skyline Communications and its DataMiner platform enable collaboration between people, between people and platforms, and through machine-to-machine interfaces. This may sound like a simple task, but keep in mind that everything starts with a solid and well-structured data collection and control plane foundation. You need to be able to collect data from just about anywhere, vendor and technology agnostic, fast and in near real-time. Only then can data consumption and collaboration functions be successfully and securely deployed on top of your technology stack.

Cloud – Connected Platform Architecture

As collaboration is no longer limited to your own employees, any on-premises platform needs to be connected from ground to cloud. Such a connection needs to be highly secured, well-defined and easy to configure.

With the DataMiner Cloud Platform, an admin can simply authenticate in the local DataMiner System first, which is often done via the corporate identity provider (e.g. Active Directory), and then in the DataMiner Cloud Platform. The latter authenticates through Azure Active Directory and supports multi-factor authentication (MFA). Based on secure JSON web tokens, encrypted signatures, and secrets stored in Azure Key Vault, a secure and permanent communication channel gets established, running on HTTPS and WSS protocols, both based on encrypted TLS connections.

While this may sound complex, it can be set up with just a few clicks by any admin. Once this is done, your IT SecOps team can manage users via the built-in web UI. They can rest assured that all connections and interactions towards the cloud are subject to one well-managed and highly secured solution, regardless of where the data comes from, across the entire operation.

Live Sharing Services

Dashboard Sharing

In the past, collaboration with customers was often based on PDF reports that were sent after an event or production was finished. Offering a digital experience to

your customers requires much more than that. Cloud-connected DataMiner Systems come with 'Live Dashboard Sharing' capabilities. Anybody can build dashboards on the fly, with real-time access to all data sources. The data sources can be mapped via drag and drop from a library of dashboard widgets (e.g. progress bars, tables, line charts, donut charts, pie charts, etc.). Once a dashboard is ready, all you need to do to create a permanent or time-limited share is add the email address of your customers or technology partner. Each recipient will get an email with a link to instantly access the dashboard via the DataMiner Cloud Platform.

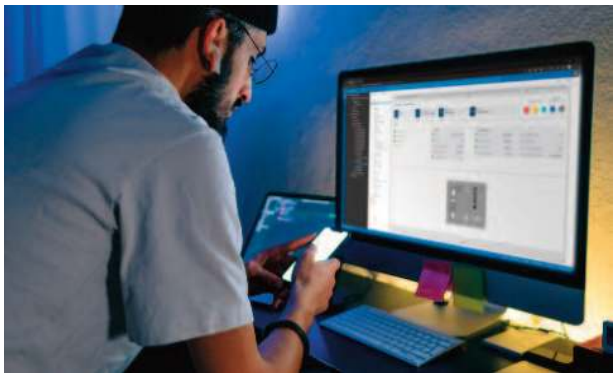
App Sharing

DataMiner 'No-Code Apps' empower people to build their own targeted applications on the fly. Like dashboards, these apps can leverage data from across the entire organization, but they typically focus on bundling all data relevant to one specific user group, inside or outside of the organization. In the example below, an MCR engineer shares a software-control panel with people working in the field to set up live RIST and SRT contribution links using 4G and 5G connectivity. These apps can be easily and securely shared, in the exact same way as dashboards. The one big difference with dashboards is that the apps allow you to provide near real-time controls for those parts of your infrastructure that you want to share with others. In our example, this is a specific group of receivers and live video sources.

1 - Live Dashboard and App Sharing

Remote Connect

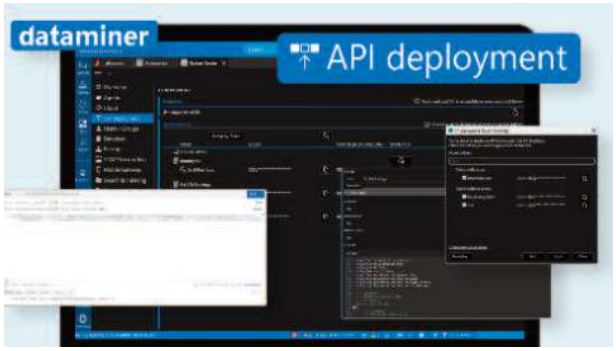
'Remote Connect' enables you to interface via the secure cloud connection and get full operational real-time access to the DataMiner platform via any browser. Depending on the user rights you were granted on this platform, you may see all products and data sources, or a subset of the managed equipment.



2 - Remote Connect

API Sharing

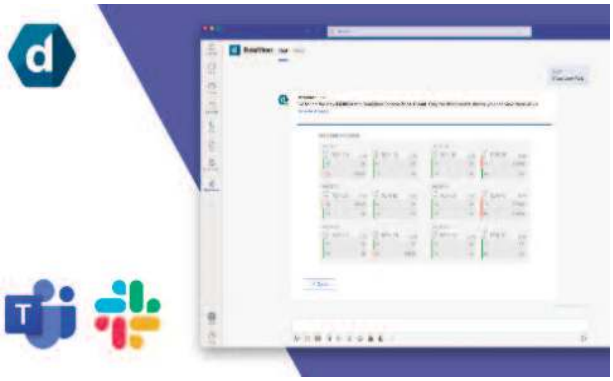
For many years now, it has been possible to use well-defined northbound APIs to have any other system access a platform like DataMiner. With such a standard API, often plenty of API calls are required to get or send the exact set of data you need. With user-definable APIs, it is now possible to develop dedicated RESTful-based APIs on the fly and publish those with just one click. Basically, any automation script or complex C# code running on DataMiner can be the foundation for your own API.



3 - API Sharing

Chatops Services HATOPS SERVICES

Collaboration is not only about sharing data. Messaging platforms such as Microsoft Teams or Slack are widely used in organizations that rely on distributed teams. With 'Chatops as a Service', DataMiner has been fully integrated as a bot in those tools. As a user, you can have conversations with DataMiner in a very similar way as with one of your colleagues. You can receive alarms and notifications, ask for a certain visual overview to get more details for a running service, or request real-time updates from any data source or product managed by DataMiner. You don't need to open any other user interface.



4 - Chatops Services

DevOps Services

Collaboration between people requires more than a platform supporting the functions mentioned above. It also comes with the need to create a true DevOps environment to build, test, and deploy applications and workflows in an agile and efficient manner. This includes an automated CI/CD delivery platform open to everyone developing new data source connectors or automation scripts, for example.

It is essential to have an open community for DevOps engineers and developers to share knowledge and expertise, where they can among others get all their technical questions answered immediately. Similarly, for agile projects with your customers, you need a platform that allows you to share project progress, detailed time expenditure, and immediate customer feedback on the small project iterations you have deployed. Only this way will all involved stakeholders and teams be able to collaborate efficiently.

Finally, it's also important that everyone can learn about everything discussed above. Every organization needs to give their teams ample time to learn and embrace the principles to be successful in a data-driven world. Whether it be for operators, admins, or developers, access to free training, which everybody can consume at their own speed, dedicated to each specific role, is crucial.

Digital transformation requires the right technology to enable people to work in an agile manner and to tackle all challenges today and in the future. This journey can only be successful if people and platforms have fast and secure access to the right data at the right time to collaborate.

Spicy Mango:
Together in electric streams –
Why creative collaboration is the key to OTT growth.

As streaming platforms establish themselves as consumers' preferred route for video content, more and more media organisations are going OTT. CTOs are discovering that success hinges on multi- vendor collaboration across the delivery chain.

The streaming market has never been more competitive, with providers and broadcasters increasingly remodelling around OTT in response to a shift in viewing behaviours accelerated by the pandemic. On demand platforms were galvanized by Covid, with locked-down customers signing up to both new and established SVOD brands in high volume. However, the spike in subscriber acquisitions has plateaued. As the world returns to more out-of-home experiences, consumers are becoming more selective in the subscriptions they retain and less forgiving of substandard experiences. It's reframing the challenges facing on demand platforms, in particular their CTOs as they look to make good on their OTT investments.

Ten years ago, people accepted the odd bit of buffering or network disruption as a small price to pay for video on demand. Today we don't. If a platform consistently fails us, we'll quickly abandon it for one that won't. The market has moved on from "build it and they will come". Keeping customers there for the long-term is the only metric that matters.

Customer loyalty is about building things properly. And so, as the Covid-led clamour for SVOD platforms dissipates, OTT players have returned to slugging it out on a familiar battleground: the user experience (UX). The smartest are discovering that success is an ensemble performance.

The UX-factor

Great UX is the key to subscriber retention and OTT growth. More often than not, the glitches that blight the user experience – and persuade frustrated customers to unsubscribe – are avoidable problems buried deep in the delivery chain. The challenge is identifying where those problems are and designing architecture that helps to mitigate them. It requires creative collaboration; the

ability to look at problems from several different perspectives at the same time and find innovative solutions through open dialogue and partnership.

OTT video distribution is a totally different beast to the linear models of broadcast TV. The end-to-end delivery chain is complex – loaded with third party solutions managing everything from customer acquisition, authentication and authorisation, through to device management, UI, content delivery and personalisation. User journeys pass through a myriad of checkpoints – log-in, language, restrictions, entitlements, billing, payment gateways, licensing, etc – many of which are facilitated by standalone products spanning multiple vendors. And those journeys need to progress with split-second timing. There's a lot to get right – and a lot that can go wrong.

OTT: the big band theory

OTT architecture calls on a big orchestra. But for the CTO, it isn't enough just to 'put the band together' – enlisting specialist vendors who can play their parts

well. The trick is to ensure that everyone performs in harmony, because one stray note can cause major discord. Data flows across the OTT delivery chain at breakneck speed. One missed beat and the whole UX can grind to a halt.

Fixing the problem isn't easy. When everyone's playing at full speed and volume, it can be difficult to pinpoint precisely where a performance is falling apart. If you don't have a 360 view of the full product orchestra – and a deep understanding of how it all fits together – you'll only end up guessing. You can spend hours fine-tuning the woodwind only to discover it was the trumpets that were flat! CTOs won't crack OTT by making orchestral manoeuvres in the dark. Misplaced focus can cost you time, money and – ultimately – customers.

Connecting the dots

The problem with many OTT platforms is that their delivery ecosystems are fragmented, comprising multiple segregated point products and 'black box' solutions. If they're not wired together effectively, the outcome can resemble an orchestra of virtuosos all playing in separate rooms. Everything sounds good in isolation, but when you put it all together the music is off-key.

Vendors naturally take responsibility for their own performance, but they can sometimes be less concerned with how they connect with the wider ensemble. It's understandable; optimizing the ecosystem isn't their job: their goal is simply to ensure their own component functions effectively. However, how that component interacts with the ecosystem is also critical. There's real added value for everyone when vendors collaborate to enhance the delivery chain.

Conducting the orchestra

Evidence shows that agnostic media technology consultants can help CTOs optimize their OTT architecture, mobilizing vendors for creative collaboration. A good independent partner is a hybrid of conductor and orchestrator: guiding the product orchestra so that everything plays together in time and in tune; and working collaboratively with vendors to rearrange the music when performances aren't hitting the right notes. Through trusted partnerships, experienced enterprise platform architects can reverse engineer existing technology stacks, bridge functionality gaps and solve complex integration challenges.

Many of the biggest challenges of OTT delivery only emerge when platforms are starting to scale. In the start-up phase, when subscriber volumes are relatively low, most issues are easy to detect and resolve or have limited impact. However, once a service touches a million subscribers – which many do quite quickly – platforms can start to encounter clusters of problems that are more difficult to identify and diagnose. If you don't fix the underlying issues quickly, they can become limiting factors in future growth. We call this 'technical debt' – because just like financial debt, it can build up on you without you noticing, but by the time you spot it, it can knock you for six.

Businesses have learned to counter financial debt by restructuring it – freeing them up to realign for growth. The same approach applies to technical debt. If you address it head-on, you can put in place measures that eliminate it over time and lay the foundations for the next growth phase. Technical debt can occur at any time and is sometimes a consequence of success – i.e reaching a scale or geographical spread faster than you'd anticipated. However, it must be tackled promptly and proactively.

Ensemble performance

The accumulation of technical debt is symptomatic of rapid growth in a fragmented ecosystem. And it shows its teeth in the user experience.

The most effective means of addressing it – and laying the foundations for transformation at scale – is creative collaboration.

The collaborative approach is best led by an independent partner that understands the full orchestra of enterprise architecture and has demonstrable experience of bringing everything together to deliver seamless OTT experiences.

A good partner will be tech agnostic but will create an environment for collaboration that enables specialist vendors to maximize their value – and helps CTOs deliver optimized OTT services that scale for future growth. A 'One Team' approach where everyone is united around a single goal: great user experience.

In today's complex multi-vendor environment, the future of OTT networks hinges on our ability to work collaboratively across the ecosystem. There is no other way.

It's time to work together in electric streams.

Why a symbiotic multicloud ecosystem matters for media and streaming

A point of view from

Michael Ritchie,
group head of media,
streaming, and gaming at
Oracle EMEA,

and Ian Broughton,
media and streaming
director at
Oracle EMEA.

Technology

The battle to secure our screen time is just beginning. The number of streaming services that any given household can subscribe to has a limit. Changing from one provider to another is easy, and it's happening with both locally and globally focused content providers, fighting for market share. Media and streaming companies need to be future-ready now and are turning to cloud technologies to focus on operational cost efficiencies while improving performance, personalization, and offering a premium experience.

A multipart solution

Accomplishing this goal seamlessly requires a symbiotic multicloud ecosystem that satisfies many different workload requirements. For example, delivering a livestreaming experience for football fans needs subsecond latency infrastructure to ensure that social media feeds don't spoil the match outcome for those watching 20 seconds behind what's happening on the field. Video on-demand requires faster access to cheap storage.

A multicloud play is the way to go. More media companies are focusing attention on building a symbiotic multicloud ecosystem to exploit the opportunities that lie ahead, securing their place at the top table as this booming industry continues to surprise us with what's possible.

A symbiotic multicloud ecosystem strategy has the following focus areas:

- Multicloud, where media companies use the right infrastructure for the right use case
- Specialist offerings that sit on this infrastructure, driving truly differentiated and innovative experiences for end subscribers from independent software vendor (ISV) partners.

According to Gartner, by 2021 over 75% of midsize and large organizations had adopted a multicloud IT strategy. The media and streaming industry has evolved quickly with

widespread acceptance of multicloud and most have a clear strategic focus in using it to scale their offerings, while maintaining high performance, which is essential for subscriber experience, especially as service offerings evolve. For cloud architecture, organizations have various requirements around performance, control, security, location, and so on. So, having different options with high performance, low latency, and comprehensive security measures is of paramount importance.

Combine these needs with a plethora of specialist ISV media and streaming capabilities, and organizations can use multicloud to create, package, and deliver spectacular video and audio experiences. It's a winning formula.

What Oracle Cloud Infrastructure can do for you

Driving more compute, storage, and networking processes to the cloud gives you more flexibility to get the highest-quality content and innovative services to customers. You want services as close to them as possible – at the edge – making them low-latency and accessible anywhere, anytime on any device. Have a quick read of the following three stories, which bring to life the power of a symbiotic cloud ecosystem.

Phenix, the real-time streaming technology platform, use Oracle Cloud Infrastructure (OCI) and another hyperscaler in their symbiotic multicloud ecosystem to provide an outstanding live video experience for sports fans. Phenix uses its own real-time streaming technology to deliver a video stream tailored to each end user's internet connection speed and quality. No matter where they are, Phenix makes sure that everyone enjoys the same play at the same instant–without frustration from buffering, delays, and spoilers. They synchronize streams at ultra-low latency and scale using OCI, while lowering the expense of delivering data to end users by 70 percent.

Tippett Studio manages award-winning media in OCI. Tippett has a background in stop-motion animation, and as a character and creature designer for Star Wars and other science-fiction movies of the early 1980s, such as Dragonslayer. Today, Tippett Studio is a high-end character and creature animation media production company. As demand for richer experiences on more-diverse viewing platforms has increased, so too has the demand for more sophisticated and robust technology.

Such innovation require

infrastructure capable of storing and rendering huge amounts of data. Sanjay Das, CEO at Tippett Studio says, if an artist changes the light in a scene, the content has to go back to the render farm. There, it takes anywhere from 3 to 10 hours per frame to render, depending on the complexity.

Tippett Studio evaluated a number of IaaS options. Das says, "Amazon (AWS) came close, but its prices were too high."

When Tippett Studio looked at OCI storage services, Das was impressed with the price and scope of the offerings. "Our use of Oracle technology allows us to recruit people and let them work remotely," Das says. "So this is becoming a global content infrastructure for us."

Tippett Studio is leveraging Oracle technology "at the bottom of the stack," he notes, but the company plans to move beyond IaaS to the next levels of the cloud stack: platform as a service and software as a service.

Crunch Mediaworks delivers improved performance, speed, and cost savings for media optimization. Crunch Video Optimizer deployed on OCI offers unparalleled video optimization. This increased optimization efficiency makes video players up to four times more likely to choose higher-quality video variants. In a recent benchmark, the Crunch Mediaworks solution on OCI was measured to run 33% faster than AWS, 54% faster than Azure, and 62% faster than Google Cloud. The solution's cost was measured to be 51% lower compared to AWS, 74% lower compared to Azure, and 61% lower compared to Google Cloud, making Crunch Mediaworks on OCI a leading choice for video optimization. If you want to learn more how Oracle Cloud Infrastructure is helping other business like yours, visit our Media and Streaming site.

Michael Ritchie:
EMEA Group Head of Media, Streaming & Gaming, Oracle
Experienced commercial professional and industry visionary with over 20 years in sales, marketing, strategy and general management, gained across every continent within the Technology, Media and Telecoms sectors.

Ian Broughton:
EMEA Media Industry Director, Oracle
Ian works with media customers across EMEA to investigate how people, data and machines can drive change to shape a better experience for the end subscriber. Pushing the boundaries of what we thought possible.

Head in the Cloud?
Adopting the Right Multi-Cloud Approach

Two years ago, the onset of the pandemic forced businesses of every stripe to adapt very quickly to hybrid working practices, and employees who had previously been office-based were suddenly doing some or all of their work from home. Naturally, for the majority of media companies, the primary focus was on maintaining continuity of business against the backdrop of an unprecedented and rapidly shifting public health emergency.

Jonathan Morgan
CEO, Object Matrix

As a result, not all of the new workflow solutions adopted by the media and entertainment industry were future-proof. On a purely practical level, there simply wasn't time to fully factor in all the potential risks and benefits. If it worked in the moment, that was considered to be sufficient, 'until things calm down again'.

Two years on, unfortunately, things have not 'calmed down' as much as we might have hoped. Remote working - or at least a hybrid of remote and on-site - has become the new normal. Media organisations and broadcasters are having to get to grips with the logistics of remote access Media Asset Management (MAM) and cloud-ready storage solutions, in order to securely store and access their files even when staff aren't in the office. A specific challenge for media and entertainment is managing huge quantities of visual data that cannot be easily uploaded and downloaded. For teams now having to deal with these enormous files, questions of maintaining workflows, storage and access are paramount. Such questions lead, inevitably, to the cloud.

Reach for the Sky

Of course, 'cloudification' isn't purely a reactive consequence of the pandemic. The evolution has been on the cards for a good while. But the pandemic has undoubtedly kicked things up a gear, and those who were still in the early stages of adoption may have had to press on before they were ready. One issue with 'the cloud', at least in a basic form, is its seemingly amorphous nature - and the name isn't always helpful. Many view the cloud as an intangible virtual space, a kind of netherworld with data floating in it, but it's good to keep in mind that data always needs to be somewhere physical. Your files aren't just in the ether, they are on servers either stored on-site or outsourced to data centres, so one major focus needs to be on how to make the data location secure but easily accessible for your purposes.

With that in mind, what type of cloud approach offers the ideal solution? Is the public option sufficient, or might a hybrid approach be better suited to the needs of modern media workflows?

There will always be variables, because even within the same industry, no two businesses are exactly alike. But speaking broadly, a media company working purely from a public cloud system might be making life unnecessarily complex and expensive for itself. Not only can security be challenging, but accessibility and flexibility can suffer too. If you think that a public cloud service used by multiple tenants is, by default, going to be secure for many threats at all times, you probably need to think again.

A public solution can, however, be part of a multi-cloud workflow approach and this is in many ways the ideal endgame. A multi-cloud approach to storing visual assets can offer a higher level of flexibility and redundancy. After all, if a business is relying on a single provider, and that provider suffers an outage or related technical issue, that could leave media assets at risk. But with multiple providers to rely on, the landscape is very different.

First Principles

If you're looking to migrate your media assets, no matter the approach you end up using, the same basic questions need to be asked - what benefits are you looking for, and what risks do you want to avoid (or at least mitigate)? These considerations would be at the forefront of any organisation's

mind when discussing the implementation of new tech, but due to the chaos caused by the pandemic, all too often businesses are having to return to first principles after the fact.

Accessibility, security and flexibility are among the most important considerations when it comes to remote workflows. Not only do teams need to be able to easily ingest, access, edit and share assets that they're currently working on, they need to have the entire archive at their fingertips – or at least, within reach. Agility is essential in a media environment. Particularly for fast turnaround content, where key moments from decades gone by need to be accessed swiftly to support live sports matches or news stories unfolding in real-time. So, if it isn't easily searchable it isn't used, so the value of keeping the data at all is diminished.

Media organisations also need to be certain that their assets are well protected. Sadly, there have been too many incidents over the past couple of years where companies have suffered an unwanted crash course in the sophistication and viciousness of ransomware. So those organisations that have the foresight to get out in front of hackers, will be in pole position within the industry long-term. But let's not forget, it is no good having additional restrictions around legitimate content access either. Often punitive metadata policies or egress charges that are imposed by public cloud providers can limit operational efficiency as well. Media organisations need flexible access, all day every day, to respond to the ever-increasing demand for content.

On the Right Path

When transitioning to cloud-based storage solutions and optimising workflows, a full audit of existing processes is crucial. What are the biggest potential threats to that workflow? What gaps need to be plugged? It might be the case that some of your existing solutions are adequate but need to be integrated with cloud-based elements, creating a hybrid solution using an on-prem foundation. Equally, however, if you do end up exploring multi-cloud, it is important to focus on providers who can integrate their offering with your current strategy and established processes. All too often, restrictive cloud services can cause headaches, because not only do they conflict with what you already have in place, but they can potentially tie you far more closely to a third party than might be ideal for your business.

There are lots of options available, a dizzying quantity in fact. But if you understand your requirements and assess the content at every stage of the lifecycle, from ingest and nearline, to archive and distribution, priorities become clear. Solutions that offer a high-level of security and round-the-clock access, as well as flexibility and redundancy, are key. But it's also important to ensure that agreements are meeting fair principles. Metadata must be shared freely throughout the supply chain and content lock-in within proprietary solutions should be avoided at all costs.

Future Plans

Of course, this is not to say that widespread adoption of cloud-based and remote working has made an on-premise solution obsolete – far from it. For most media organisations, a hybrid approach will be the 'Goldilocks Zone' moving forward. But again, this will be a test of a cloud provider's flexibility as much as the individual company's willingness to adapt. Will cloud providers be able to respond to the industry demands, with the same agility as broadcasters themselves?

Unfortunately, Covid-19 is going to be with us for the long haul. And while there are no guarantees that it won't continue to affect our working lives and impact the industry at large, there are changes that companies can incorporate here and now to protect themselves against future disruption. Risk can rarely, if ever, be fully removed from the equation but it can be prepared for and mitigated - all it takes is the right approach.

You can find out more about Object Matrix's hybrid approach here.

IABM appoints Jennifer Garry as North American Membership Engagement Executive

We have recently appointed Jennifer Garry to the newly created position of North American Membership Engagement Executive.

Reporting to IABM Head of Membership Engagement, Jennifer Garry will provide the same high level of interaction and support of IABM's extensive membership in the Americas time zones that has recently been provided to members in Europe. This includes ensuring that they are aware of, and taking advantage of, the full range of benefits and services the Association offers. These range across Business Intelligence, technology and standards updates, the Technology and Trends Roadmap, knowledge and education, extensive support at events, and a raft of opportunities to promote their companies, products and services to IABM's worldwide audience. Jennifer's role will also include expanding IABM membership in North America.

Jennifer Garry is ideally qualified to help Americas-based IABM members exploit their benefits to the fullest. Having begun her working life as a publicist and TV agent in New York, Jennifer then moved into membership management, sales and director positions with a number of local, regional and business trade associations including, most recently, the Arlington Chamber of Commerce, Enterprise Wireless Alliance and the City Club of Washington.

"With their prestigious reputation in the industry, I am thrilled and honored to be a part of the IABM team," said Jennifer Garry. "I look forward to learning more about the needs of our members and utilizing my skills to help ensure that we continue to meet their ever-evolving requirements."

"It quickly became obvious that our Head of Membership Engagement was providing a very valuable new service to members when we introduced the role in January 2020. We naturally wanted to rapidly expand this activity to cover member companies with one-to-one engagement beyond the European time zone," said Peter White, CEO at IABM. "We were however constrained by the pandemic – but the time is now right and Jennifer Garry has exactly the right experience to hit the ground running and get our North American members much more engaged with their association and all it has to offer. Jennifer will be very busy at NAB Show 2022!"

The latest model from FOR-A shoots at up to 1000 frames a second, which means that one second of crucial action could be replayed over 40 seconds

The practical approach to Ultra HD

Peter Hattan
General Manager, FOR-A UK Ltd

It is clear that there is considerable consumer interest in Ultra HD – 4k resolution and high dynamic range colour. Particularly for sports, it presents much more detail, so is more engaging and involving.

There was a tendency to think that the only way to deliver Ultra HD is through an IP network, probably using SMPTE ST2110. But early adopters have found it operationally difficult. Particularly in the high pressure world of live events and outside broadcasts, configuring and managing networks is a much more demanding task than simply plugging in SDI cables.

There is much to be said for SDI. It is robust and comprehensively understood by engineers. With 12G technology it can support Ultra HD over a single cable, the way we have done since standard definition days.

True, there are transmission challenges with Ultra HD over 12G SDI, but with care in the cabling and the right hardware, it is perfectly possible to get the high reliability we expect: for outside broadcasts it is ideal.

12G routing may not be as compact as an enterprise IT switch, but SDI has been with us a long time, and by now it is pretty much bullet-proof. That is why, for many, it is the pragmatic, practical option.

FOR-A is a Japanese company, and we have recently celebrated our 50th anniversary in the business. While we are a global supplier, inevitably we are influenced by our home market. That is a good thing: as a nation Japan was an early adopter of Ultra HD (and even higher resolutions), so we were actively encouraged to develop innovative products to support it.

Japan was also host to a major multi-sports event earlier this year, which was a global showcase for broadcast technology, and what the host broadcasters could deliver. Drawing on its unrivalled Ultra HD experience, it largely went with 12G SDI.

There are many practical issues around producing large-scale, premium quality sports coverage in Ultra HD. Perhaps the most significant of these is that you have to have a single production workflow, from camera to delivery.

Doubling any part of the pipeline would be economically catastrophic. So we have to work on the basis of one set of cameras. Having separate HD and Ultra HD cameras would also increase the seat-take in the stadium, which is never popular. Those cameras have to feed a single production switcher, with a director choosing shots on a single multiviewer.

Not all cameras will be Ultra HD. It may not be practical or cost-effective to equip point-of-view positions – football goalmouths, cricket stumpcams and so on – with Ultra HD cameras. So you have to up-res these HD cameras to Ultra HD before the switcher. You may also have to do some colour processing to match the colorimetry with the main cameras.

This processing needs to be extremely low latency: sports fans above all others notice time jumps, when they want to know precisely what is happening at this very instant.

HDR and its associate extended colour gamut is also hugely popular. But there are multiple ways of encoding HDR, so the infrastructure also has to include transcoders between HDR10, HLG, PQ and more. Production in one HDR format and distribution in another is quite common.

Another layer of the production chain is the expectation that key action points will be replayed, and that slow motion replays will bring the audience closer to the action, more involved in the fine detail of the decision-making. Did that ball cross the line? Did the ball hit bat or pad first?

Smooth slow-motion replays demand high speed cameras, with the direct correlation that the more detailed the replay, the higher the frame rate recorded. The latest model from FOR-A shoots at up to

1000 frames a second, which means that one second of crucial action could be replayed over 40 seconds, perfectly smoothly without interpolating frames.

Such replays are only possible during breaks in the action, of course. But there is no doubt that they add tremendously to emotion and understanding for the viewer. Super slo-mo cameras are subject to the same requirements as the rest of the production. It is not economical to have a separate operator, not practical to take more seats to create the perfect camera placement. Which means that the super slo-mo cameras must have a conventional, realtime output: in Ultra HD, with the same image quality as the rest of the camera fleet so pictures can be inter-cut without disturbance.

Finally, there is the age-old problem of frame rates. Japan is a 59.94 country, so this year's major events were shot at that frame rate. For other markets, there has to be frame rate conversion which must be clean without hitches or freezes. And, like everything else in the production and distribution pipeline, it has to have the lowest possible latency so the audience is confident it is seeing the action as it happens.

At FOR-A we are proud to have supplied a significant number of 12G video processors to the major sports events in Tokyo, successfully fulfilling the functions I have talked about and more. As they do with many other sports and live productions, they deliver quality and flexibility, at a good price point. 12G infrastructure proved the right way for the world's biggest multi-sports event, but for any production, large or small, there is a strong sense that it is the practical, pragmatic choice – for now at least.

NativeWaves Helps Redefine Fan Engagement At Live Sports Events

Roland Vlaicu
Senior Advisor – Product, NativeWaves

As the world embraces the 5G rollout, companies in many different industry sectors are seeing this new technology as a game changer that has the capacity to transform the digital experience. Promising to be up to 30 times faster than current network infrastructures and with the potential to deliver virtually instant two-way data transfer, 5G will undoubtedly unlock assets, resources and services in ways that we have only just begun to imagine.

For the broadcast and streaming industry, 5G is already making a significant difference as vendors develop products that use this technology in ever more innovative ways. Whether it is enabling easier access to cloud-based production workflows, allowing remote and live productions to become more reliable and cost effective – especially in places where public WiFi is either unavailable or unreliable – or enhancing the user experience for audiences at home and at live events, 5G is undoubtedly having an impact that cannot be ignored.

Testing 5G For Remote Production in Live Sport

As part of its highly acclaimed media innovation Accelerator programme, IBC recently lent its support to a multi-company, project-based initiative that examined the onset, rollout and continuing evolution of 5G for remote production and live sports.

Austrian solutions provider NativeWaves was one of nine vendors, developers and solutions providers who took part in this project, working with eight 'Champions' – broadcasters, content owners and studios who buy technology at IBC – to put 5G under the microscope. The aim was to see if it lived up to its promise to untether and enrich broadcast production and creativity and bring a host of new immersive experiences to viewers of live sports events.

As an emerging streaming technology company, NativeWaves was delighted to be involved in this initiative. The company is already playing a key part in the development and adoption of technology that

delivers a personalized viewing experience across multiple screens. The high precision, low latency and synchronization solution offered by NativeWaves provides instant access to alternate camera angles, graphics, audio and data feeds so that audiences can choose what they want to see without any lagging sequences or interruptions.

For this project, NativeWaves was in exalted company, working alongside numerous Champions and vendors including Aljazeera, BBC Sport, BEIN Sports, BT Sport, Fox Sports, Olympic Broadcasting Services, Ooredoo, SuperSport, AVIWEST, Evertz, Grass Valley, Mobile Viewpoint, Microsoft, Net Insight, TVU and Taswer Productions.

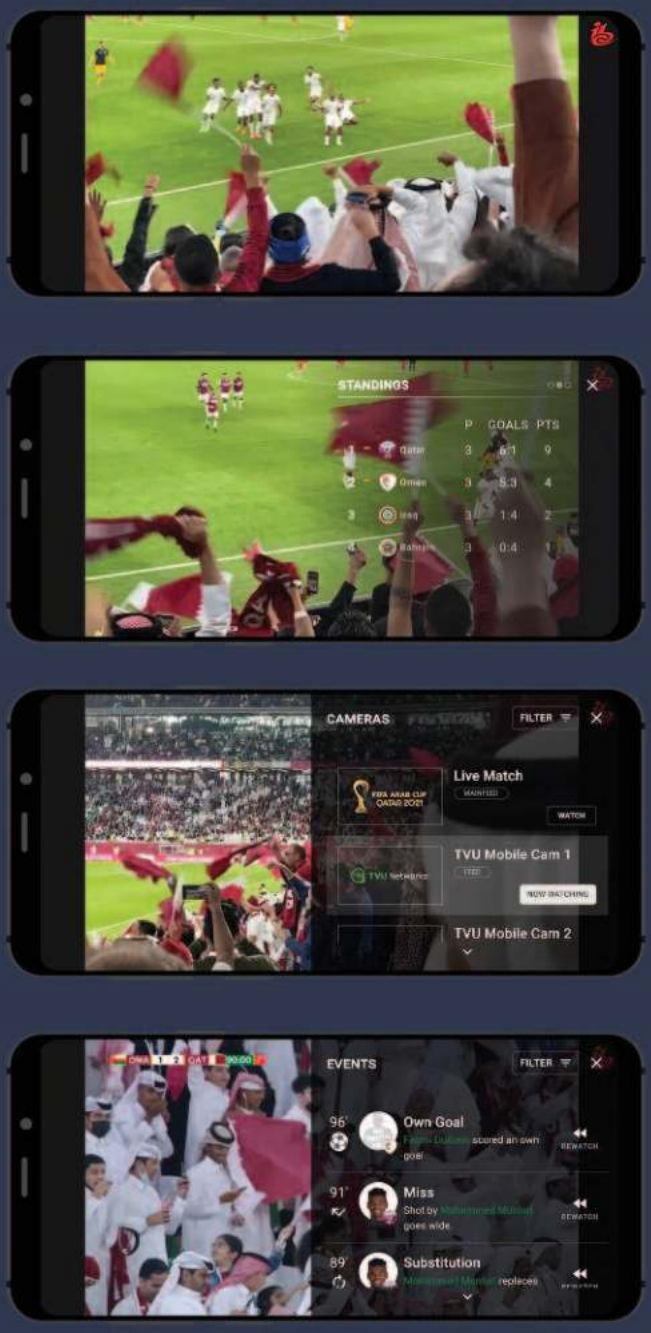
Christof Haslauer, CEO of NativeWaves, says: "We had planned to unveil our new NativeWaves EXP platform at IBC 2021, but when the show was cancelled, we were delighted to showcase our technology via this IBC Accelerator project."

The events chosen to test 5G workflows and technology were two concurrent soccer matches in Qatar in December 2021. These were an Arab Cup match that took place in a major stadium and a youth match that took place at a venue nearby. The Arab Cup is an established football tournament, but the fact that it was taking place in Qatar made it a perfect testing ground for new technology that might be used at sporting events such as the FIFA World Cup, which is also taking place in Qatar later this year.

Over 60 people in 12 different countries were involved in the IBC project, which aimed to show how 5G could be used to create a unique fan experience in a stadium and at home.

"We were investigating 5G's ability to transfer captured content into the cloud in an extremely fast and efficient way, and to allow many fans in a stadium to concurrently stream high-end content," Haslauer says. "For rights holders, it was an excellent opportunity to explore a more direct and personalised relationship with their fans by giving them greater access to content that was already being generated."

The project participants used a range of innovative cameras to capture as much content as possible from both soccer matches. These included AI automated cameras, drone cameras, normal TV cameras (operated by Qatar-based BEIN Sports) and handheld iPhone cameras, which were used to gather footage from the fans' perspective in the stadium. All content generated



by the cameras was fed to the cloud via 5G. From here, production staff using Grass Valley and Evertz equipment created a professionally produced TV experience.

"User Generated Content captured via iPhones allows fans to experience the game from different seats in a stadium and to see what is happening in other fan zones," Haslauer says. "Combining raw User Generated Content alongside professionally made broadcast footage is very powerful and exciting because it brings an entirely new dimension to the live sport experience. Obviously, if you want broadcast grade latency and

synchronisation, you can't have everyone trying to upload content all at once, so for this experiment Al Jazeera had various people located in different seats who were sending footage to the cloud via 5G. I believe, in future, we will see streaming providers and stadia having their own apps and inviting selected people onto the platform to upload content from the audience perspective. This will need to be managed to maintain quality and editorial control."

What NativeWaves Brought To The Project

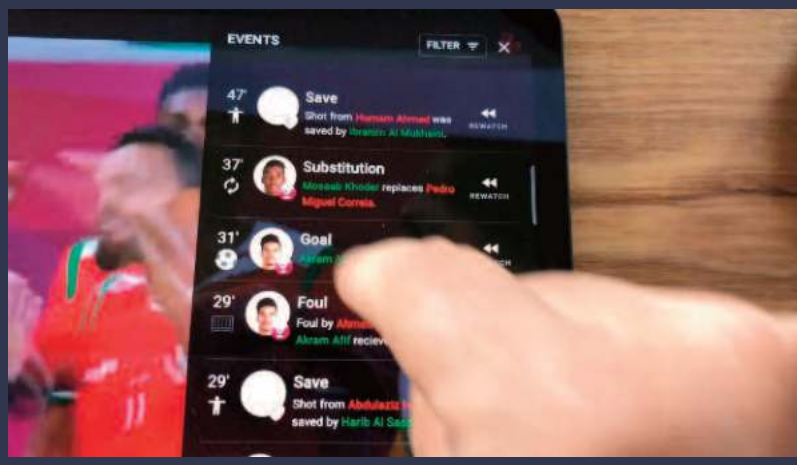
NativeWaves' role was to take charge of the fan experience. To this end the company created an IBC branded app using its NativeWaves EXP platform, which aims to make it very simple for broadcaster and streaming providers to offer an enhanced OTT experience. Using the app, fans could select the match they wanted to watch and switch through various camera views so that they could see the action from different perspectives. They also had the ability to interactively choose data and graphics overlays (line-ups, player stats, match stats, predictive data, etc.), and watch replays and key moments from different camera angles.

"We were the aggregators because we were taking content from as many different sources as possible and bringing it all together," Haslauer says. "It's not just about camera content; we were also integrating match data from Stats Perform and user polls generated by graphics company Singular Live to create a compelling and unique user experience."

Finding the right balance between low latency and genuine synchronisation was one of the key challenges identified by this IBC Accelerator project. In a multi-vendor environment, different encoder and decoder technology must work together seamlessly to ensure that these issues are overcome.

"If you are in the stadium, the perfect user experience is to be able to watch camera angles from different parts of the stadium with super low latency of less than a second so that it appears almost live," Haslauer says. "This project showed that it is possible to do this, which is very exciting. It also showed broadcaster and streaming providers the huge potential of engaging and interacting with fans by providing replays and additional stats and data. In those situations, latency is not an issue because the experience in not live."

Haslauer adds that, from NativeWaves perspective, the project was a huge success because it allowed the



company to showcase its new NativeWaves EXP platform to established industry players and build long-lasting future partnerships and friendships.

"With NativeWaves EXP, we have a platform that delivers the low latency and synchronisation needed to do everything broadcasters or venue owners want," he says. "Our aim is to take all the aggregated content we receive and build an interactive user experience that really enhances viewer engagement and enjoyment, whether they are in the stadium, on the move or sitting at home watching a live event on TV. Broadcaster and streaming providers can easily build our technology into their own apps, and we have various options available depending on what they want to achieve. Being able to participate in a project like this was so valuable and we are very grateful that we were invited to take part. It's been a fantastic learning opportunity and it's very exciting to see the potential for 5G across all live and sporting events."

For further information, please visit:
www.nativewaves.com

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"Interesting times..."

Nigel Burtt
Environmental Regulation Consultant, IABM

We work in an industry that is designed to deliver interesting and dramatic content to our consumers via all broadcast and digital media channels for news, sport, documentaries, movies, theatre, music, et cetera. The last few years have certainly been dramatic for everyone with the upheavals of Brexit, a global pandemic and most recently a war in Ukraine to name just a few of the recent major events that will surely be in all the future history textbooks.

The old ironic adage *"May you live in interesting times"* certainly seems like the curse it was originally intended to be. Looking at my dog sleeping as I write this, the supposed original Chinese version of this phrase which is *"Better to be a dog in times of tranquillity than a human in times of chaos"* definitely feels appropriate for our current era.

Our industry is probably no worse affected than any others, but the electronics supply chain is certainly feeling the pain. The US-based electronics industry body recently published the results of a survey with contributions from hundreds of companies of all sizes from all around the world, intended to show the current sentiment within the full electronics manufacturing value chain. Their report 'The Current Sentiment of the Global Electronics Manufacturing Supply Chain' is freely available via their website and found that rising material costs and shortages remain a problem which is expected to get worse. Their 'April 2022 Economic Outlook' report is similarly gloomy, especially for the European market, although so far the order book demand is still high with both the US and European industry well positioned to ride out the crises.

In the field of product safety and environmental protection regulation it is also "interesting!" In the Summer last year the UK government granted a very welcome delay to the implementation of its UKCA (UK Conformity Assessed) product compliance and marking scheme designed to replace the European Union's CE compliance scheme for goods being sold in Great Britain (GB – England, Wales and Scotland). This meant that the UKCA scheme was not made mandatory as of 1st January 2022 as originally planned and industry now, currently, has until 1st January 2023 before implementation becomes a requirement.

Of course, the complexity of Brexit means that there also has to be a companion UKNI marking and compliance scheme for Northern Ireland (NI) as part of the UK due to its shared land border with the Republic of Ireland and thus the EU. The implementation of this has not been delayed and depending on the type of goods and where they will be placed on the market, products must have different markings or combinations of the CE, UKCA and UKNI markings, which needs some attention to get right.

Meanwhile the government also suggested that the deadline for the implementation of the UK's replacement system for the EU's REACH regulation for chemicals would be delayed by two years and registrations for the UK database would only now need to made by October 2025.

If this wasn't confusing or "interesting" enough, in February 2022 the newly appointed Minister of State for Brexit Opportunities and Government Efficiency, Jacob Rees-Mogg MP, gave an

interview in which he appeared to fully endorse the sentiment of an Institute for Economic Affairs (IEA) report *'Changing the Rules: A Unilateral Approach to Non-Tariff Barriers'* calling for the UK to unilaterally recognise EU regulations and conformity assessments, which would include allowing the CE scheme to continue alongside the new UKCA scheme.

However, just a few days later, the government said that its position was unchanged and the UKCA scheme was still being implemented as before, with the Financial Times reporting on the frustration and confusion within both government and industry and quoting an official saying "We didn't know if this was a change in policy, or if the minister was just freelancing, but it looked very much like this hadn't been through the Whitehall government policymaking sausage machine."

The UK government has however made a series of webinars available with associated guidance documentation to try to help businesses that operate both within and outside GB and NI navigate this "interesting" maze for UKCA/UKNI/CE product regulation compliance.

Meanwhile, the European Commission (EC) has now updated its 'Green Deal' strategy to include a proposal for an updated Eco-design Regulation published on 30 March 2022 to make products more sustainable. This 'Sustainable Products Initiative' (SPI) has progressed to the adoption stage and the EC is seeking feedback on the proposals in a consultation period that runs from 03 April 2022 - 30 May 2022. There is a useful summary report of these wide-ranging proposals published by EURACTIV available in PDF format here. IABM members are encouraged to review the proposed regulation and check for any impact on their product designs and operations.

Don't let your Standards drop

Paul Treleaven
Specialist Technology Consultant, IABM

The last time I wrote a standards update for the Journal – Q3 2020 – I started:

In the covid19 era, the regular standards meetings that we attend have certainly been disrupted, but like many other aspects of our industry, virtual technology has stepped in as a substitute. The system is working, though not being on the meeting's timezone can require attendance at some difficult hours!

I never imagined that I would still be attending virtually for the SMPTE March 2022 meeting round that has just ended. There is hope that the SMPTE June 2022 meeting round will be in-person once again; plans are for Brigham Young University in Utah.

The IABM continues to attend SMPTE and AES meetings as well as monitoring other relevant trade organizations and consortiums – more below.

Are Standards still relevant? Should they be free?

The move from hardware-based to software-based products has potentially enlarged the field of broadcast and media product designers to anyone who can code. Members of this community enjoy the freedom to design without restrictions and, if they do decide to conform to a standard, they certainly expect to find the standard free-of-charge on the web! The Internet Engineering Task Force led the way with free standards and organizations like SMPTE are considering how standards could be made freely available (some important ones currently are free, to help during the pandemic). Also, SMPTE's 'public CD' process (more below) exposes standards under development for implementers to consider; again, removing the paywall that might deter them from experimenting with technologies that can aid interoperability.

The AES makes its standards free to AES members – a valuable member benefit.

All these efforts to keep standards relevant and accessible work towards the important goal of interoperability. IABM has established that customers want to build their systems from best-in-class products, without being tied to one vendor. Standards achieve this, and they can help to make customers embrace new technologies – e.g. IP with ST 2110, streamlined mastering with IMF, new content formats and their mapping into MXF.

Standards Update – AES

Much of the AES standards work concerns audio fields that are not directly relevant to Broadcast and Media. But the following work items are:

AES67 – High-performance streaming audio-over-IP interoperability

This standard has reached a good level of maturity and adoption. The last published version – 2018 – is being reviewed for revision. The topics under consideration are extensions or clarifications, so backwards-compatibility should be maintained.

The AES67 task group published a report in September 2021 'AES67 beyond the LAN', recognizing the growing importance of remote production and discussing the issues.

AES70 – Open Control Architecture suite (and related documents)

The last published version of this 3-part suite – 2018 – is undergoing considerable revision. The biggest change is a much-improved connection management process, though other improvements are being introduced to support new 'adaption documents' that enable AES70 to control AES67 and IEEE's Milan streams. An additional JSON document is planned for the suite.

Standards Update – SMPTE

SMPTE's 'public CD process'

This process was introduced in 2020 and has quickly become the norm for new standards. It exposes the document to the public at the Committee Draft (CD) stage before it has been balloted. The intention is twofold. The public becomes aware of the work much earlier than it would with the full publication process and it permits implementations to 'test' the provisions and contribute to improvements before publication.

At the time of writing there are 16 documents on the public CD page including 3 whose review period is closed.

SMPTE's new initiative – Rapid Industry Solutions (RIS)

This initiative is not part of the standards activity, but it does recognize the need for agile solutions to technology challenges. The first RIS topic is On-Set Virtual Production. More details.

Media over Managed IP Networks

The ST 2110 transport suite continues to grow. Some mature parts are close to completing minor revision. Details on published parts. New parts in development are:

- Fast Metadata (FMX)
- Data Item Format for ST 2110 Technical Metadata
- Special Considerations for Standard Definition Video using SMPTE ST 2110-20
- Measurement Definitions
- Timing Planes (using timestamp features to automate computation of chain latency)

Media Microservices

Two Microservices documents are on the public CD page, 'IMF Registration Service API' and 'Microservice Status Reporting and Logging'. Development is underway on two more documents – 'Media Microservices Terminology' and 'Job Processing Architecture'.

Interoperable Mastering Format (IMF)

This suite of documents describes methods for simplifying mastering to generate multiple formats. Much of this suite has long been published, with some revisions along the way – details. Three new documents are underway defining macros for Output Profile Lists.

Metadata Guided Audio (MGA)

Two standards on mapping metadata guided audio into MXF are close to publication and an additional project is starting to map MGA metadata into ST 2110's FMX streams.

Media Standards Work in Other Organizations

The Video Services Forum has groups working on ST 2110 over WAN, a Pro-AV version of ST 2110 called IPMX, Ground-Cloud-Cloud-Ground transfers and Reliable Internet Stream Transport (RIST).

The Advanced Media Workflow Association (AMWA) has an ever-growing family of Networked Media Open Specifications (NMOS)

These complement the SMPTE ST 2110 transport suite with additional interoperability specifications:

- Discovery & Registration
- Device Connection Management
- Network Control
- Event & Tally
- Audio Channel Mapping
- System Parameters
- Authorization
- Sink Metadata Processing (very new)
- Control Protocol (very new)

Status information is available here together with other documents including Best Common Practices.

The Joint Task Force for Networked Media (JT-NM) did much of the groundwork that initiated SMPTE 2110 and NMOS. It has published 'System Environment and Device Behaviors For SMPTE ST 2110 Media Nodes in Engineered Networks – Networks, Registration and Connection Management' – document TR 1001-1, freely available here. It provides further definitions beyond ST 2110 and NMOS to achieve interoperability in media networks.

There is also a 'JT-NM tested' program for validating products against ST 2110, NMOS and TR 1001-1. 'Self-tested' catalogs were added whilst Covid19 disrupted in-person testing – see explanations and catalogs here.

IABM Standards Resources

Standards Meeting Reports

The IABM devotes a lot of effort to supporting and helping to develop the standards that underpin the technology in Broadcast and Media. Much of that effort occurs 'behind the scenes' – we attend SMPTE and AES meetings and contribute to the smooth introduction of''

standards and improvement of their content. Whilst there are many other standards bodies that are relevant to members, we have selected these two as the best places to channel our resources.

After attending AES and SMPTE meetings, we produce reports covering all the projects that we think members may be interested in.

You can also find all SMPTE reports here and all AES reports here (login required).

The IABM Standards Monitoring Group (SMG)

For this activity, we have selected SMPTE and AES project groups (often with members' recommendations) and we participate in their teleconferences – typically held weekly or fortnightly. This provides an up-to-date picture of the state of their documents and development work.

We make that information available to technologists in our member organizations with our Standards Monitoring Group (SMG). The SMG is a forum where members can comment on the provisions contained in draft standards documents and IABM can submit those comments as part of the consensus-building process in the drafting group. It is usual and encouraged for the participants in drafting groups to consult with their colleagues to review and improve the provisions of documents. Information on joining the SMG is on this website page.

SMPTE projects currently monitored by the SMG:

- Media over Managed IP Networks – ST 2110 suite
- Network-based Media Synchronization – ST 2059 suite (now including monitoring and security projects)
- Microservices in Media (four standards projects)
- Extensible Time Label (four parts including new KLV representation and MXF mapping)
- Study Group: required application protocol standards for IP-based media production
- AI and Media

AES projects currently monitored by the SMG:

- Streaming audio metadata over IP
- Streaming audio-over-IP interoperability – AES67 (continuing revision and associated work)
- Open Control Architecture – AES70 (includes revision and adaptations for connection management of AES67 and other formats)
- Projects on EMC mitigation and audio interconnections

Please consider whether you could participate in the SMG to help improve standards under development with only minimal time investment.

Monitoring Quality and Regulatory Compliance is no Longer Expensive... and can even produce an ROI

Actus Digital – Traditionally, TV stations and networks have used standard aircheck recorders and compliance logging solutions to comply with federal regulations, such as proof of airing closed captions/subtitles, non-violation of Loudness laws (such as the FCC's CALM Act), and more.

These compliance solutions have evolved as new regulatory requirements were passed and technology standards evolved, such as SD to HD, ATSC-1.0 to ATSC-3.0, and other video protocols that have emerged as standards, like SMPTE ST 2110, and ABR (Adaptive Bit Rate) OTT streams.

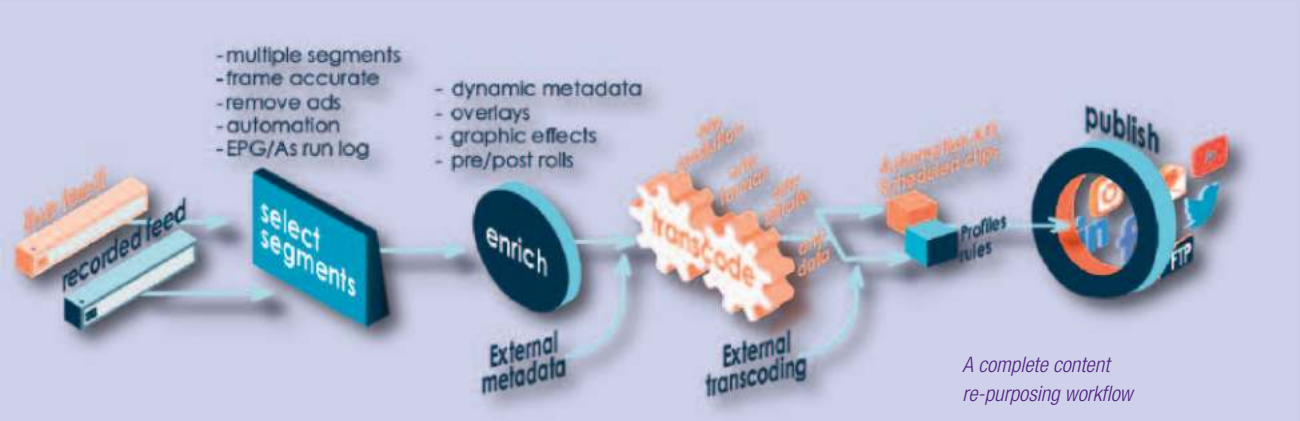
The best solutions in the monitoring and logging space not only keep up with standards, but also innovate with features that add value, such as alerts on audio and video issues, airing color-bars, missing metadata, Transport Stream analysis, and more.

For networks with many distribution points... and for stations with primary and digital sub-channels, some of these solutions evolved to integrate multiviewers to monitor many channels at once, and add tools such as alert notifications, multiple language audio bars, display closed captions, Penalty Boxes showing channels in fault, and widgets to add items like time-zone clocks, metadata such as SCTE messages, TS data, and more.

The latest technology allows customization of multiviewer views that synchronize multiple probe-points for the same channel, enabling a user to see the audio, video, and metadata as they received it via IP, as it traveled via SDI through their facility, after they modified and MUXed it, as it traveled via ASI to their transmitter, and as return feeds are captured from Over-the-Air ATSC via antenna, Cable/Satellite return feeds via HDMI, and ABR OTT as it streams simulcast onto their website and/or digital distribution partners.

With Actus Synchro, once a channel is detected to be in fault, Synchro will show that channel at every probe point, identifying precisely where the problem was introduced, allowing Engineers to quickly remedy it. Similarly, when monitoring a single OTT rendition experiencing a fault, users can see every rendition of the ABR stream and pinpoint which renditions are in fault.

Actus Synchro pinpoints where errors are entering their video distribution chain and identify which renditions in an OTT ABR set are problematic.



A complete content re-purposing workflow

When integrated with a Traffic system, discrepancies such as the variance between what was programmed in the Play List to air, and what it shows in the As-Run Log that actually aired, can be automatically evaluated with reports highlighting the differences.

Extending access to the compliance and monitoring platform to other departments delivers additional value, and a Return on Investment. Here are a few examples...

Compliance solutions have never been in a post-production workflow... until now.
Repurposing Content – Saving original resolution high-quality video on this platform formerly just used by Engineering opens up many other workflows and use cases, including post-production and content repurposing.

Adding Actus Digital's Clip Factory Pro onto the same platform allows users to clip and concatenate content, add effects such as graphic/animated overlays, pre-roll/post-roll, cropping, blurring, and more... which can all be performed without going to an edit bay or even leaving the 'QA/Compliance Platform'.

Driving even greater productivity, the entire workflow can be saved into profiles so that users can select clips, select a profile, and let the system produce high-quality, well-produced content... every time... lightning fast.

Faster still, automation can be set up so that these profiles run on their own based on rules pertaining to a schedule of certain times on certain days or As-Run Log, EPG, or any other metadata. The system is intelligent enough to automatically remove all commercials and utilize all of the settings from a saved profile.

Clip Factory Pro users beat their competition to digital rebroadcasting on Social Media platforms (Facebook, Twitter, Instagram, YouTube, etc.), which builds viewer loyalty and draws them back to their primary over-the-air linear broadcast.

These same systems are being used in high-quality, prime-time workflows, where content is captured and pre-selected from networks where short clips can be taken from and integrated into news programs, abiding by all rights guidelines.

"All I Want is an Unfair Advantage" – Unknown News Director
News is a competitive environment where any technique that can drive ratings up result in higher Ad-Revenue and increased profit. So when the Intelligent Monitoring Platform evolved to assist with ratings improvement, News Directors took notice.

Some of the tools that help News Teams to improve ratings include keyword alerts when competitors air "breaking news", collaboration tools that allow stories to be bookmarked and categorized and viewing ratings-graphs displayed right next to the content that aired on each channel to illustrate what is working... and what isn't.

Increase PPM, Revenue, and Bottomline Profit
One workflow that directly produces an ROI is AdWatch, which can identify new Ads in a market and report on the number of times each ad runs on each station in the market. This helps Ad-Sales teams to maximize PPM and revenue by presenting them with lead lists of advertisers spending more on competitive channels and also by helping them improve their sales pitches to prospective advertisers by referencing the station's rating performance to the specific demographics that appeal to that advertiser.

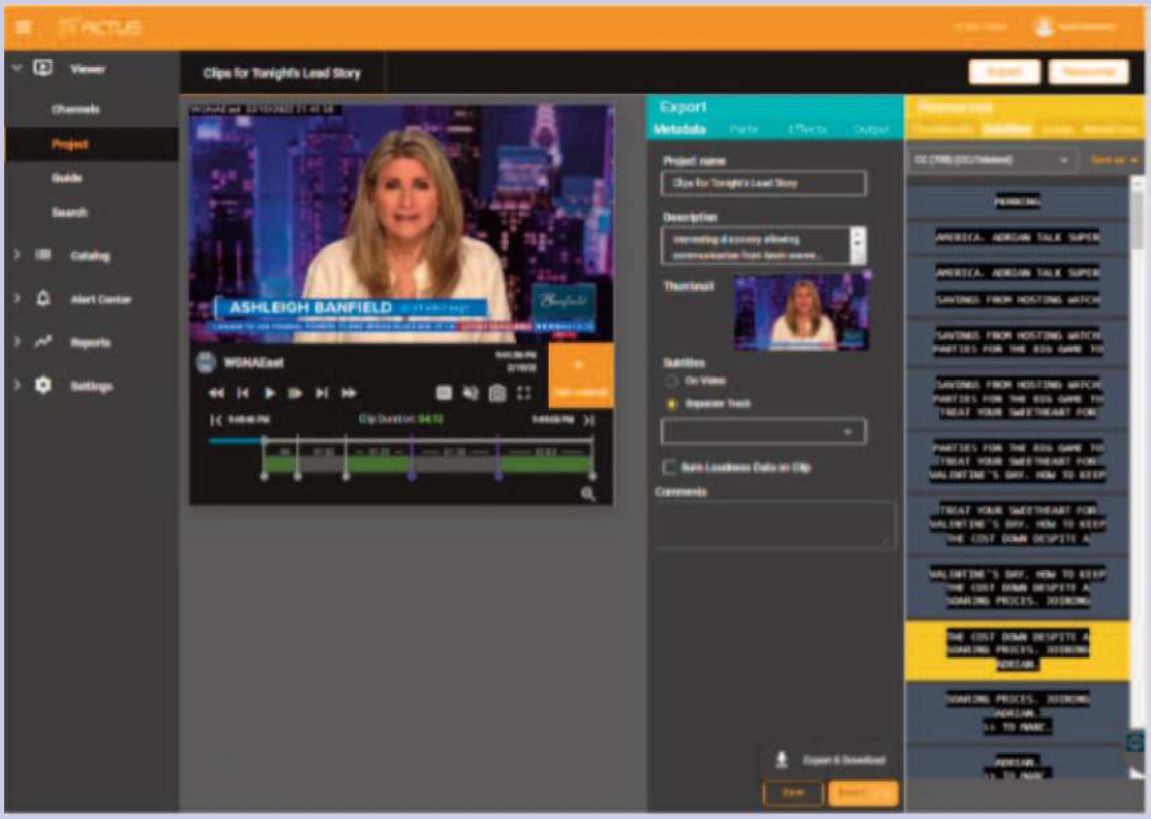
Live Programming is Your Greatest Asset
The future of linear television is uncertain amidst the popularity of VoD and OTT sources, however live news and sports are the lifeblood of linear programming. Why let all the effort that goes into producing top quality content produce only a single payday and expire the moment it airs?

The best Intelligent Monitoring Systems like Actus Digital, have Asset Management built into the same platform. Actus Light-MAM increases the value of media archives, allowing users to create a rich metadata asset library from scratch or integrate with existing MAM systems so their high-quality content can be easily searched and become a part of a VoD library or integrated into future programming.

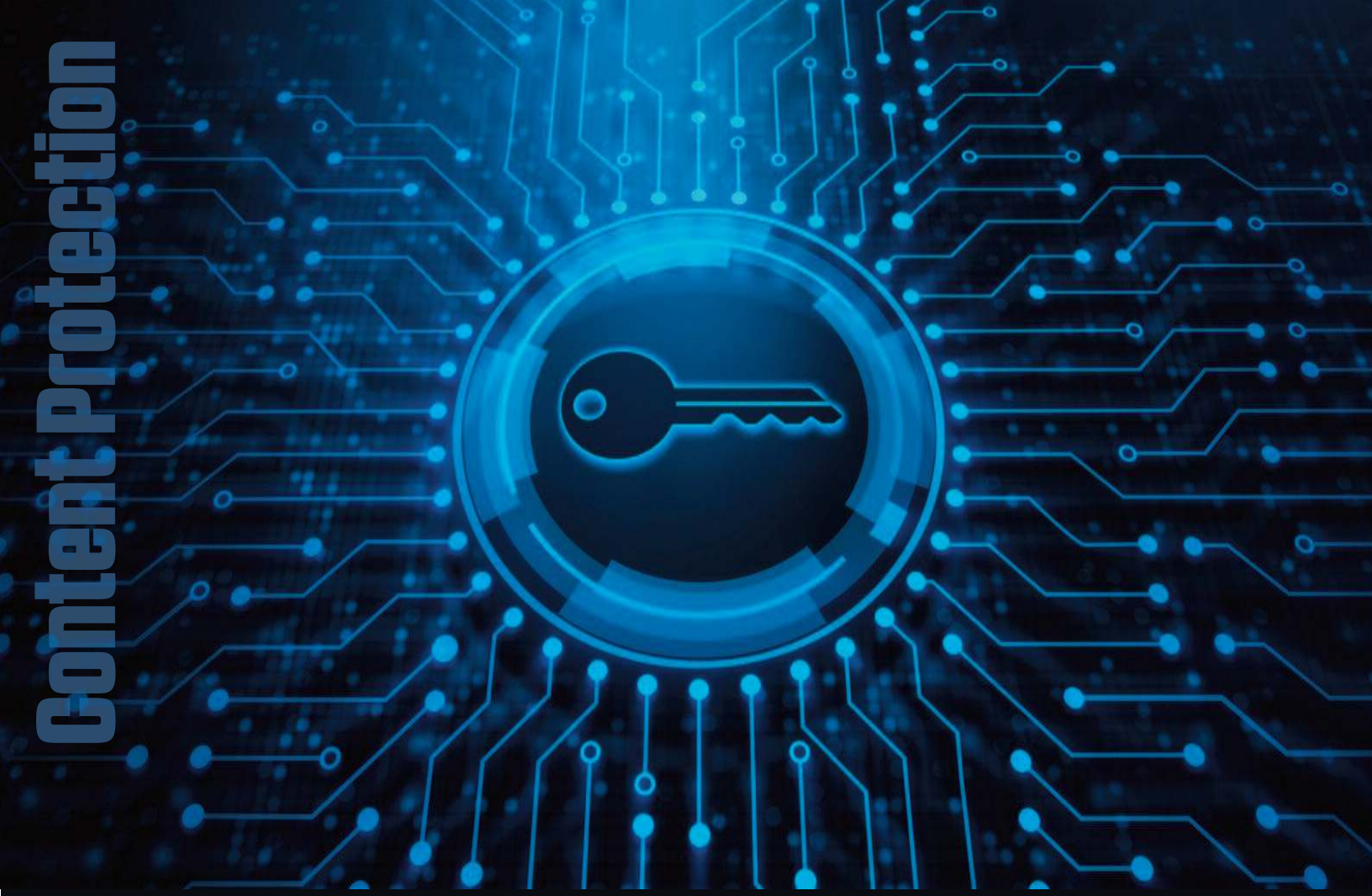
Metadata is key to turning your media into an asset. Metadata generation can come from multiple sources, such as extraction by a compliance system (like original air-time, channel source, closed captions/subtitles, SCTE information, etc.). Additional metadata can be imported from third party systems like Traffic and Playout, as well as advanced AI engines for things like speech-to-text, language translations, and facial recognition.

One Platform... Many Beneficiaries
A compliance logger doesn't have to be an expense burdened by only the engineering team. If an intelligent monitoring platform like Actus is chosen at about the same price, that investment can serve the entire station, pay for itself, and produce an ROI when used by Digital, News, and Sales Teams.

After receiving feature requests from many of the over 600 Actus customers, across the last 17 years, the Actus Intelligent Monitoring Platform has evolved to not only offer the industry's most affordable and comprehensive tool for engineering... but a facility-shared resource that makes it one of the most intelligent investments a broadcaster can make.



Actus Clip Factory Pro is being used by Nexstar's NewsNation production teams in Chicago and New York to preview content and select original quality clips that air on the national news and entertainment cable network reaching 75-million television households across the United States.



The State of Content Protection Technologies

IABM carried out an in-depth survey on media companies' preferred content protection strategies in Q3 2021 on behalf of Axinom, and produced an authoritative, in-depth report on the state of content protection technology based on full or partial responses from 137 content protection technology experts at media companies from around the world.

The survey base covered service/technology providers, OTT platforms and streaming services, broadcasters and Pay-TV operators with subscriber bases ranging from 10k to 10m+, and employee counts ranging from just 1-5 to 500+. On these companies' monetization models, 45% were SVOD, 34% Hybrid, 12% AVOD and 9% TVOD. Across all these media organizations, the average share of original programming in their content portfolios was around 40%, with larger businesses (serving over 1m subscribers) running higher volumes of original content at around 56%. Most of these businesses predicted an increase in the percentage of original programming they will carry over the next three years, and most expect the cost of that original content to increase significantly – and so too their investment in it.

On watermarking, most businesses prefer forensic watermarking (51%) while 15% choose visible watermarking and 33% using both types

Content is key – and so is protecting it

Original content is clearly seen as a key element in the ongoing battle to attract and retain viewers. This is illustrated by the finding that the media companies with the smallest percentage (vs their other business costs) of investment in original programming expect to be spending significantly more on original content over the next three years as a proportion of their total costs.

Protecting that investment is a key concern for most media businesses, with 65% saying that Digital Rights Management (DRM) solutions are very or extremely important, with the lion's share of these being OTT platforms. Currently Fairplay is the most favored DRM technology in use (74%), followed by PlayReady (66%) and Widevine (61%). OMA is preferred by 22% and Marlin 20%. These high percentages point to the next finding – that 44% of companies use multi-key DRM solutions rather than relying on just one technology.

The findings on satisfaction with all these different DRM technologies paints a slightly different picture, with Marlin the most preferred by a considerable margin despite its relatively small user base. Widevine and PlayReady also score reasonably well, FairPlay much less so with OMA significantly further trailing.

Other content protection solutions were also covered in the research, with watermarking currently used by 55% of media businesses, device management/concurrent playback restrictions (the latter mostly DRM-based) by 40%, and scalable key rotation by 32%. On watermarking, most businesses prefer forensic watermarking (51%) while 15% choose visible watermarking and 33% using both types. The preference is for solutions that can identify both whether a pirated video is being originated from their services and track down the source used to steal it.

Fragmentation driving complexity for media companies

In order to paint the broadest picture of the technology choices and problems facing media companies, the survey also asked about encoding, streaming protocols, codecs, and platforms/devices supported.

In terms of encoding providers, 34% of media businesses rely on AWS Elemental, 17% on Bitmovin, 17% on Microsoft Azure and 15% on Harmonic. Most currently support SD, HD and UHD operations and 48% support HDR today, with 33% planning to support it in the short term, - with HDR10 and HDR10+ preferred by the majority (54% and 51% respectively).

In chosen streaming protocols, HLS and MPEG-DASH are most used (78% and 75% respectively), with RTMP and RTSP following (67% and 66%). AVC is by a considerable margin the most preferred video codec (91% of respondents), followed by HEVC at 68%. Interestingly, while MPEG-2 is next on the list at 59%, the number of companies with no plans to use it jumps dramatically compared to AVC and HEVC. Newer codecs VVC and LCEVC unsurprisingly bring up the rear of the list; adoption may increase as they become more established.

The final application data asked for in the survey was on the support of platforms and devices, with browsers and Android and iOS all supported by 84%+ of respondents, followed by Android TV (69%), Apple TV (61%), Smart TVs (58%) and Chromecast (57%). Fire TV, Roku and gaming consoles bring up the rear at around 40% each.

Looking forward

So much for the present state of content protection – but what about the future? The survey asked respondents to look forward – what are the most important content protection trends? Quality of media experience came out as the leader (41%) closely followed by concerns over fragmentation of platforms/devices/standards to support (38%). Coming in at only the 8th and 9th priorities were Security Breaches leading to Content Leakage and Screen Recording – however these were also identified as the number one and fifth priorities for businesses today.

The Covid pandemic has also had a notable impact on content protection trends, with illegal access to media content and content leakage top of the list of trends growing in importance, alongside quality of experience and fragmentation. Screen recording, streaming trial fraud and credentials tampering/sharing occupy places 7-10 on the priority list, but all with a significant reported net impact on businesses.

Geographical differences

Geographically, the report finds that breaches leading to content leakage is most important in Europe and the Americas while interfering with video content and illegal distribution are top of the list in MENA and credentials tampering is the highest priority in APAC and also of concern in the Americas.

Conclusions

Overall, the prioritization of business and consumer trends over pirate-driven ones was consistent across different types of media businesses. However, while pirate-driven trends were ranked as less important, most of them were classified as high priority, with cross-border illegal access to content and security breaches leading to content leakages identified as more important due to the Covid pandemic.

With most businesses predicting their original content investment will increase significantly over the next few years, it seems counter-intuitive that content protection solutions are not a primary business priority given the increase in piracy activity in all its various forms. One of the reasons behind this is the complexity of the advanced content protection landscape, which constantly needs to counter pirate-driven innovation. This means high budgets for content protection and a struggle to keep up with fast-paced developments effectively. In summary, the effects of complexity on technology understanding and pricing are important factors determining media businesses' deprioritization of content protection technology.

82% Of media businesses are focused on business or consumer-driven trends rather than pirate-driven trends to address content protection

41% Of Media businesses say that quality of media exoeriences is the most important trend in content protection

23% Of Media businesses say that security breaches leading to content leakages is the most important pirate-driven trend in content

53% Of OTT platforms say that fragmentation of platforms / devices / standards to support is the most important trend in content protection

Figure 1: Content protection trends highlights

The key to addressing this is moving to flexible content protection technologies, including:

- **Technical flexibility** – to integrate content protection systems within existing operational settings and naturally leans toward multi-DRM solutions
- **Commercial flexibility** – to keep in step with industry moves to more flexible payment schemes
- **Digital flexibility** – eliminating any impact from content protection systems on digital customer experience features, enabling media companies to maintain their primary focus on digital platforms

Most media businesses included in the survey reported that content protection technology models were evolving in these directions, though in some cases are yet to deliver the required across-the-board flexibility. Large media businesses often have departments dedicated to content security, so they possess the necessary resources to keep up with content protection security developments, as well as engaging in behavior-changing initiatives to educate consumers on the consequences of piracy. However, smaller media businesses are less likely to consider content protection technology a business priority because of the lower level of resources they have available to oversee this.

Figure 2: Driver analysis of content protection investment (Red boxes indicate negative drivers, green indicate positive drivers)

Other factors were also cited as deterrents to content protection investment:

- Minor content leakages onto platforms such as YouTube can be leveraged as promotional tools to drive viewers back to the source with a superior quality of service
- Niche content is less attractive to pirates because of its reduced global appeal, so protection is less of an issue

At the other end of the scale, high-profile sports and high-end scripted productions justify a focus on advanced content protection solutions, and this can go beyond just the media company. For example, in sports, collaboration between rights holders and distributors sets minimum standards for content protection, including the adoption of specific technologies such as DRM.

As content protection technology models continue to evolve and the complexity decreases, the likelihood of their inclusion in these standards increases.

We mentioned YouTube above; media businesses highlighted that collaborating with them (and other large digital platforms) on issues such as copyright infringement was a business priority – pirates are increasingly resorting to legal internet platforms to help build their illegal distribution networks. Most felt that complete protection may never be possible, but this close collaboration should alleviate content leakage issues and drive viewers back to their own platforms. This also explains why most media businesses identified watermarking as one of their top investment priorities – when a leak is identified, watermarking can help them find and take action against the source quickly.

Looking forward, we see the combination of flexible content protection technology to minimize content leakage/theft at source, working hand-in-hand with watermarking technologies to quickly shut down any bypassing of at-source content protection.

You can download the full report here. This link is:
https://theiabm.org/state-of-content-protection-technology/

Overcoming the challenges of head

Audio

You probably won't be totally surprised to learn that at Genelec, we firmly believe that in-room loudspeaker monitoring is unrivalled during the recording and mixing process! But we readily accept that high quality headphones play a very important role as a supplementary monitoring tool.

phone monitoring

Howard Jones
Genelec, Communications Director

Here we'll explore the ways to bridge the gap between monitors and headphones so that you can seamlessly switch between the two and achieve a more natural, uninterrupted workflow.

Working with loudspeakers

Loudspeakers are usually preferred for monitoring because audio presentations can traditionally only be designed reliably using loudspeaker reproduction. Loudspeakers work together and they also interact with the room, to create the experience of acoustic space and auditory images appearing in the presentation.

When we're listening to in-room monitoring, the sound radiated by loudspeakers is reflected by the walls and surfaces in the room and arrives at the listener with a slight delay, and from different directions. This reflected sound is called 'early reflections'. These reflections contribute to experiencing both a sensation of space and distance from the loudspeakers.

Working with headphones

Headphones are typically used to monitor smaller details in a mix because they can offer excellent signal-to-noise ratio and isolation from in-room background noises, so low-level audio becomes more clearly audible. For audio professionals, there are all sorts of situations where headphones become really useful. They're ideal when working remotely in ad-hoc environments, for situations where loudspeaker monitoring just isn't possible, or for those that simply wish to check how their mixes translate to headphones.

But, when headphones are placed over the ears (or inside the ears), the sound is directly delivered into your ears. Then, head-related sound colour changes cannot occur. Also, the headphones on your head always remain at the same location, so it's no longer possible to use head movements to help with sound source location. These are the reasons why conventional headphones struggle to provide an accurate reference, since sounds seem to happen 'inside' the listener's head – thereby losing their natural sense of space and direction. See figure 1.

Figure 1

Suppose you use both?

If you equip yourself with both neutral, accurate studio loudspeakers and high quality professional headphones (with low distortion, colouration and L/R variation) then that's an essential starting point.

But to really bridge the gap between loudspeakers and headphones, you'll need to explore the emerging technologies that are able to analyse how you hear sounds from an in-room loudspeaker system, and then start to recreate that same experience via headphones.

The key to these technologies is the Head Related Transfer Function (HRTF), which is the way that your head, external ear and upper body affect and colour the audio arriving from all directions. When that effect is modelled and then applied via signal processing to your headphone monitoring feed, then this recreates virtual sound images 'outside' your head, and enables you to hear the sound stage again, providing a sense of space and direction similar to that presented by loudspeaker-based monitoring.
See figure 2.

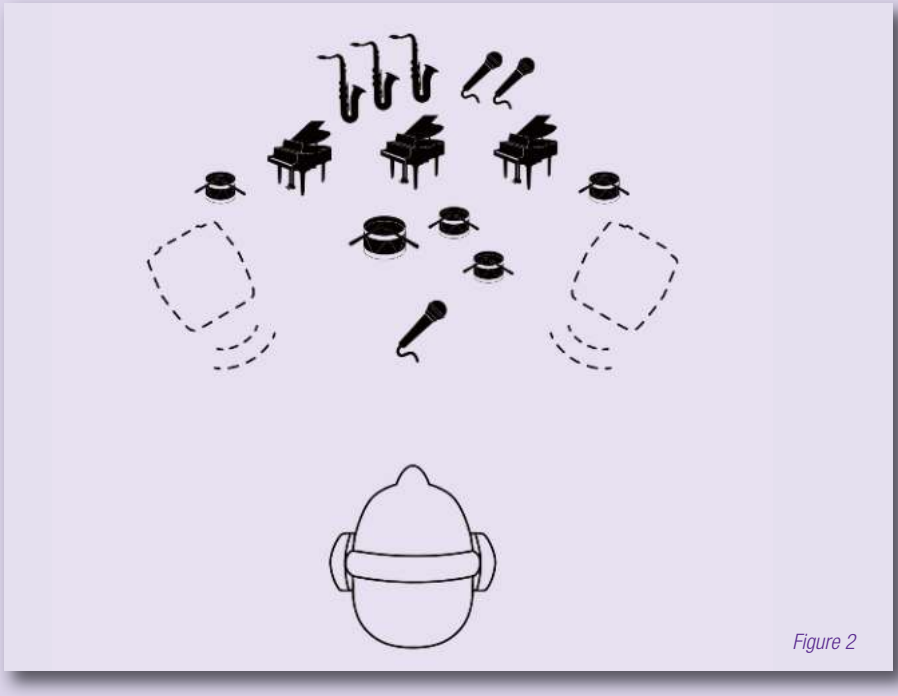


Figure 2

Getting personal

The modelling of a listener's HRTF used to be a very complex and time consuming process, but modern technology has made things much easier, and there are now options for using both 'general purpose' HRTFs (usually created by using a generic dummy head and torso simulator with some further adjustment to better suit the individual user) and completely personal HRTFs which are modelled on the user's unique physical attributes. The latter method has been a key focus area for us at Genelec in recent years.

Once an HRTF has been modelled, then some headphone monitoring technologies offer a further series of refinements such as compensating for the colouration that headphones will introduce, and for creating, positioning and level-adjusting 'virtual' monitors in the headphone mix too. This helps the listener to simulate the layout of their in-room monitoring system and can also allow them to adjust their own orientation in relation to the virtual monitors.

This accurate localisation of sound becomes even more important when working in surround and immersive formats, where the precise placement of sound sources becomes crucial in producing multi-channel mixes that translate consistently to a wide range of playback devices.

Conclusion

There's no doubt that quality headphones are an important and convenient supplementary monitoring tool for many audio professionals, and this is one of the key reasons that we unveiled our Aural ID technology back in 2019, and subsequently introduced the Aural ID personal plug-in earlier this year.

The ability to switch seamlessly between loudspeakers and headphones, and get reliable translation between the two, is worth its weight in gold for any audio professional.

Good headphones have always been a valuable part of any audio engineer's toolkit, and the good news is that they now have the potential to become much more trustworthy monitoring companions in the future too!

Introducing Telos Infinity® Virtual Intercom Platform: **Transforming a hardware-based broadcast intercom platform into a Cloud solution in months, not years**

Martin Dyster
VP of Business Development, Telos Alliance

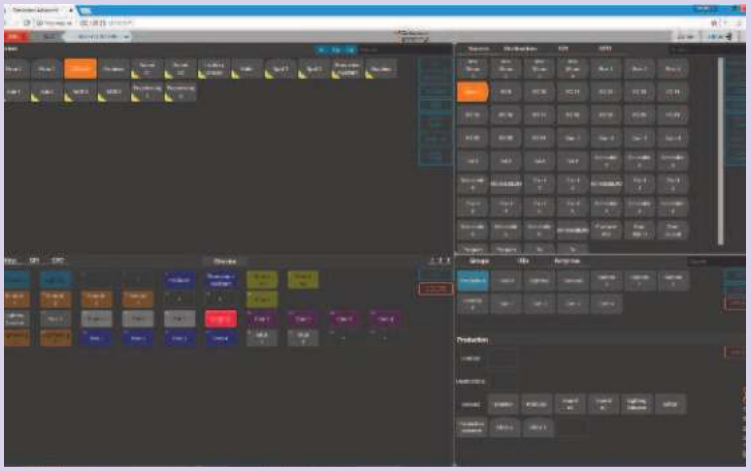
June 2020, in response to multiple inquiries from a global broadcast market reacting to a global pandemic, Telos Alliance® transformed the Telos Infinity IP Intercom Platform (Infinity IP) from a hardware product into a working Cloud deployable software solution. The software team had a working beta available for testing within just a few months from a standing start. The team proved that the physical panel firmware developed for the hardware product launched in 2018 could be deployed using containerized software technology and replicate the functionality of the hardware platform almost entirely.

As with most development projects, the old adage of completing 90% of the work in 10% of the time and the remaining 10% taking another 90% has been true of Telos Infinity Virtual Intercom Platform (VIP). The many variations in use cases, internet security practices, and even upgrades to mobile phone platforms influenced the project timeline while providing a valuable learning experience for the team that will streamline many future Telos products.

Infinity VIP has been met with universal praise as an innovative solution that meets and anticipates market demands: Here is the story behind it.

Intercom is a mission critical part of most broadcast workflows, and as TV broadcast is transitioning towards a virtualized model, it seems only logical that intercom should be virtualized as well. This is the stance that Telos Alliance took back in mid-2020 when realizing that although the hardware-based Infinity IP supported remote working models (one of the driving forces behind an accelerated move towards the virtualization of video production), it simply wasn't practical to package and ship a physical panel to every remote participant, and then in addition, hope that the recipient was tech-savvy enough to get the device online at their location.

Telos always planned to develop a software panel add-on to the Infinity system; however, with the emergence of Cloud workflows and a global pandemic accelerating the need for more agile communications solutions, a software panel solution became the number one priority in meeting the needs of a broadcast industry during an incredibly challenging time.



So how do you take a product built on a hardware platform and turn it into a software equivalent? More importantly, how do you do it quickly and from a standing start?

The legacy Telos Infinity hardware platform is a pure Audio over IP (AoIP) solution with a distributed architecture. There is no central engine or matrix to replicate, and a system can be deployed on any AES67 compliant network. Each device is 'standalone' and does not rely on others to function, only to communicate between one another. Given this architecture, a virtualized version of the product could theoretically be designed around the same principle, with individual software panels replicating their hardware equivalents in some way. But how could this become a reality? Enter software containerization.

A container is a lightweight means to package software code and all its dependencies so that an application can run quickly and reliably within a virtualized computing environment. Docker is an example of containerization technology and already familiar to the Telos software team. They determined the core operating code developed for the physical Infinity product could be containerized using Docker to create a virtualized network of individual devices (panels) that could communicate to one another using the same core AoIP network topology, if they were connected on a common VLAN which would act like an AES67 media network. In short, a virtual intercom platform could become a reality using Docker and operate in much the same way as physical Infinity hardware. Telos Infinity VIP was born.

Creating a network of virtual intercom panels that can communicate with one another is one thing but transforming it into a product that could enable users anywhere in the world to communicate with each other is something else entirely. But the Infinity virtual panels used the same core code as their hardware siblings which in turn already had a built-in web server, supported device discovery using Telos's own Livewire protocol and could receive and transmit AES67 audio using common intercom features like Partylines, Groups, IFBs and Peer to Peer calls. The answer came down to using standard media protocols supported by the web server, which would in turn, be used by anybody with a compliant browser. If users navigate their browser to connect to the web server of a virtual panel, they would be looking at a panel on their screen and they could control it with the click of a mouse. If the audio devices on that computing device are supported by the browser, they would have an input and an output on their virtual panel using web audio. Plug in a USB headset and voila, virtual intercom! It sounds easy, and to an extent it was relatively simple to get that far, but that's where the 10% / 90% rule kicks in. All the tricky stuff.

Web audio being used for intercom is great provided your computer isn't doing much else. But this is a product that is going to be used in virtualized media production, so the computer could be busy with a multitude of other tasks and won't care about audio packets arriving on time and in order. Web audio doesn't do well in a busy environment, but WebRTC does. WebRTC is designed to be robust, uses the Opus codec, supports variable bitrates, and has in-built encryption. The team moved onto making WebRTC the default connection mechanism for VIP.

Understandably, intercom users want secure connectivity and reliable audio. WebRTC is perfect for this too, but when traversing the Internet, it needs Stun and Turn to make robust peer-to-peer connections, so that capability was added to VIP. Many customers don't want to use public Stun and Turn servers because they may expose the system to security risks; therefore, the team had to address that concern. And software products need to be managed by a licensing mechanism. Additionally, there was a need for a metering system to support Software as a Service (SaaS) use cases, private DNS, a secure invitation mechanism so the right person gets to use a panel through an auto-generated password, and finally, API support for 3rd party control devices like Elgato Stream Deck.

Except, it isn't really 'and finally'. There was also the need to build a virtualized four-wire interface so that VIP can connect to non-panel-based audio (like Mixer Auxes, Mix Minuses, Camera Comms, Talent etc.), plus a phone App to create a better user experience for customers with Android and IOS devices, NDI support (hopefully both available by the time you read this piece) and a seemingly endless stream of feature requests from the growing number of interested customers for whom VIP seems to have really struck a chord.

Roughly 18 months after development started, VIP is used around the world with customers who appreciate the long hours that went into building it. It is a genuinely one-of-a-kind product and can be considered a disruptor. Here at Telos, we are very proud of VIP and the dedicated, brilliant team of Telos design engineers who continue to push the envelope.

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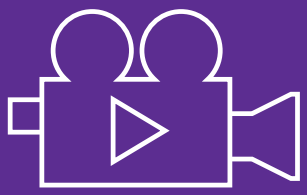

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Churn rate: you must divide the total number of subscriptions that have been cancelled on a given period by the total number of subscriptions on a given period

Jump Data Drive Video – Avoiding Churn With Data-Driven Solutions

Andrés García Raffo
Marketing Content Specialist

In the universe of video services, the abandonment rate is a key metric to take into account. It measures the number of users who unsubscribe from your service during a certain period of time.

How Do We Calculate the Churn Rate?

Measuring your churn rate is simple: you must divide the total number of subscriptions that have been cancelled on a given period by the total number of subscriptions on a given period.

However, video services have a more complicated task. Much more complicated. Not only do people sign up or unsubscribe, but there are also those who simply switch packages, upgrading or downgrading.

For data regarding churn to be useful to video platforms, it's important to understand the main influences that cause customers to churn from your platform. What are these factors? What factors attract new users? How well is the content offering working? Does your platform have a good UX? How is the quality of your user's experience (QoE)?

Having all this information and being able to correlate it in an optimal way is key to anticipating and making business and marketing decisions focused on attracting and retaining customers. This way, the company can spend less capital on acquiring new customers, taking into account that attracting new users is way more expensive than working on keeping existing ones.

What Causes Customer Churn?

There are several reasons why users abandon a video service, but the most important ones are the following:

Price

The most common reason a user decides to leave is that they may have found a cheaper alternative that fits their needs. Hence why it's important to know how to adapt the prices of your service based on demographics and geographic variables and, above all, how to play with different business models within the same platform, which is something we are seeing already with companies such as Peacock, with their hybrid AVOD/SVOD model, and Netflix, who are in the process of analyzing if an AVOD model would work for them.

It's common for companies to offer free content (FVOD) that engages with their audience in a specific region, and then offer the following chapters in a subscription format (SVOD). On the other hand, it may also be a good alternative to create a diverse set of subscription packages at the same time, just like Prime Video, offering content through subscription (SVOD) as well as allowing their users to select a specific content they want to watch for a price (TVOD).
The options are endless, and each video service should explore, based on the data, the strategy that best suits their interests.

Affinity Between Content and Target

It's important to have a clear understanding of the target audience and the content oriented towards them. If the content doesn't fit the consumers, they will unsubscribe. Making personalized content recommendations and promotions will make users feel better about your service, retaining them on your platform.

User Experience

If the experience is negative, it will be less likely for customers to use or want to use your platform anymore, which will result in a loss of customers. In this case, Quality of Experience (QoE) tools are key for video services to solve real-time problems that may exist on their platforms before their users realize. Having this information is also key to helping their customer service departments by identifying the problems beforehand and solving requests.

How to avoid customer leakage?

Around 10% of customer churn can be avoided with proactive communication campaigns, attending to customers, and solving their problems. Thus, we suggest following three recommendations:

Plan and optimize the customer journey

When a lead becomes a client, the journey transforms from a buyer's journey to a customer's journey, which must include their post-sales experience, and the support you provide. It is here that CRM tools (meaning, a software platform that allows companies to unify the management of accounts, contacts, sales, communications, and other data about current and potential customers) bring value, as they can be used to record all types of interactions.

Communicate your platform's value

By offering trials, interacting with your users, creating a content database, or publishing videos of your customer's interaction with your platform, you can give your customers clear information on the value of your platform through different channels, educating them on what differentiates you from your competitors.

Create a data-driven personalized experience

By understanding your customer as deeply as possible, you can reduce customer churn, as knowing a lot about them, about their likes and dislikes, allows you to give them a personalized experience that is unique to them, thus avoiding abandonment.

If you want to learn more about cancellations, check JUMP's whitepaper on how to reduce churn and avoid the mass SVOD cancellations predicted for 2022.

About JUMP Data-Driven Video

JUMP Data-Driven Video is a Software-as-a-Service (Saas) company that joined the media and entertainment industry in 2016 with the explicit mission to champion video services' optimization. Their vision that business data – and its effective use – being the key differentiator for successful players in the industry has proven to be true.

By using **Big Data, Artificial Intelligence**, and **Machine Learning technologies** to improve video businesses' ROI, JUMP has developed a platform to optimize audience **retention, personalization, engagement, and marketing effectiveness**: Everything you need to jump to the next level!

Companies such as Vodafone, Hallmark, Pureflix, TVN Pass, among others, trust JUMP to get advanced analytics and personalization for their platforms through JUMP Insights, JUMP Personalizer, JUMP Lakehouse, JUMP Business Impact, JUMP Retention, JUMP User DNA, and JUMP QoE.

For more information visit JUMP Data-Driven Video at **https://www.jumpdatadriven.com**

New ad technologies heighten the appeal of CTV-led programming

The introduction of new ad formats on connected TV-led FAST platforms promise an ROI boost for content owners & advertisers, and a seamless viewing experience to consumers

Srinivasan KA
Co-founder,
Amagi

2021 was a year of massive growth for connected TV-led programming. The streaming momentum scaled exponentially while undergoing rapid transformations. Subscription-based streaming – once the mecca of premium content – made way for ad-supported models with their offer of easy, lean-back viewing. The result was an explosive growth in content monetization opportunities on CTV-led Free Ad-Supported Streaming TV (FAST). In 2021, CTV ad spend grew by 34%, totaling $5.4 billion for the year.

FAST: a buffet of opportunities, sprinkled with challenges

The FAST space continues to be an attractive revenue model for content creators and advertisers alike. While digital channels and traditional linear TV have offered distinctly different value propositions to content brands and advertisers so far – more users on digital, more brand awareness on traditional linear TV – CTV-led FAST has combined the two.

However, the biggest appeal of FAST is the promise of a lower ad load. Different FAST providers have set varied limits for the ad breaks in their content streaming. Peacock has opted for a 5-minute ad break per hour, while other content brands like Discovery+ and HBO Max have set the limit at 4 minutes. Rukuten's FAST platform, Rakuten Viki, has opted for the lightest ad load so far – a mere 2 minutes per hour.

The low ad load, while immensely appealing to consumers, poses a few challenges for content creators hoping to maximize their ad revenue opportunities. Ad solution providers have realized that navigating the ad load conundrum requires some amount of ingenuity on their part. The need of the hour are advertising formats that are unobtrusive for the viewer, while offering creative solutions to content brands for hitting their revenue goals. Technology providers like Amagi are way ahead of the curve, with new, innovative solutions crafted for this very purpose, such as dynamic brand insertions, graphic overlays and contextual ads.

New innovations to navigate the ad load dilemma

Amagi collaborates with leading video data platform, IRIS.TV and in-stream ad solutions provider, Triple Lift, to help content owners scale their programmatic ad revenues. A closer look at how some of the new ad formats achieve that purpose -

Dynamic Brand Insertions (DBI), also known as native advertising, embedded advertising or in-content advertising, is a cross-platform, targeted, audience-based video advertising system. With DBI, advertising messages can be streamed right into the video content that audiences are watching.

Ad creatives can be streamed into places where real world objects - billboards, bus stops, and so on - are present or inserted into the video output during post production.

DBI offers two distinct advantages to content owners: 1) it enables targeted deliveries of relevant ads to consumers, increasing the likelihood of consumers taking an action on the ad displayed, and 2) it facilitates a seamless viewing experience for the end user, without any unwelcome or long ad breaks.

Graphics overlay ads, a popular concept in traditional TV and digital media, is now making its way into OTT and FAST. Graphics overlay is a one-of-a-kind technology offering that helps overlay contextual ads as lower third banner ads on CTV-based linear channels, intuitively based on the video content.

The benefits of in-video overlays are abundant. When compared to traditional TV commercials, graphic overlays are more affordable and easily interchangeable. Content owners can also offer up more inventory to advertisers that significantly increases their ad revenue margins, while reaching more viewers unobtrusively.

Contextual advertising allows advertisers to place ads based on the video content. It is an innovative way for advertisers to obtain at scale ad opportunities that are contextually aligned to programming while ensuring better brand recall and greater audience engagement. Content owners too gain by higher ad conversion rates and effective content monetization.

Several leading content providers, such as Tastemade and Crackle, have added context targeting capabilities into their CTV inventory, and many more are avidly embracing the solution. Amagi has enabled its participating content partners to integrate the benefits of the technology by offering contextual and brand-safe data for videos in collaboration with IRIS.TV.

2020-21 data reveals all

Amagi's quarterly industry report throws light on the emerging advertising trends in the FAST ecosystem. The latest edition highlights the growth of ad revenues between December 2020-21. The data generated from Amagi's analytics tool revealed that ad impressions grew by 134%, indicating that ad-based revenues are on the rise. The report goes on to state that popular FAST platforms, while investing in premium content to attract advertisers and audiences, are also experimenting with the new ad formats as a way to capitalize on the ad opportunities that FAST presents. Given the relatively new nature of the ad formats (in the CTV programming space), many are still testing the waters, but finding great satisfaction in the results.

Given that the new ad technologies adequately cater to the disparate needs of all the parties involved - improved ad revenues for content owners, better audience engagement for advertisers and uninterrupted viewing for consumers – they are poised to become an integral part of the CTV ad environment, promising tremendous growth in the months to come.

If you are a content owner seeking to unlock new content monetization opportunities and generate better ROI, drop us a line at cloudandme@amagi.com.

The IABM Technology and Trends Roadmap

Stan Moote
CTO, IABM

In the previous year, the technology and trends roadmap had an area noting the COVID impact in various technologies. It was a battle to quickly respond to sudden closures and locked-downs that related directly to taking on the risk of trying newer technologies. Frankly, there was nothing to lose. It might not be broadcast quality, however viewers were anxious to get pretty much any fresh content regardless of the quality, basically COVID Quality became the norm.

These efforts dramatically affected various aspect of the industry's future direction. When getting into the specifics, some technologies were simply put on hold while others flourished. It was less about risk and more about figuring out how to use pretty much any technology available to line up with revised business plans.

Our IABM Roadmap Group had noted that is was appropriate to denote some of the adjustments made due to COVID – how new technologies were adopted, adapted or even accelerated from a normal adoption curve.

COVID Adjustments

General-purpose corporate tools and solutions were quickly embraced for use in professional media workflows. Remote collaboration has become more acceptable. The jury is still out on whether this can foster longer-term innovation. Capture devices such as PTZ and mobile/tablet cameras are mature in their own markets, however still in the early adopter phase within our industry. Low latency remote desktops are well accepted for production now.

New technologies, such as continuous near real-time push of files from field camera to cloud-enabled production, are emerging which fulfill a need to keep staff in the field and out of offices. Linear publishing is taking advantage of newer formats such as social, gaming and streaming. All in all, the use of various cloud services is no longer in early adopter stages, however many certainly aren't fully mature as certain aspects such as redundancy are still in question.

Remote Production

The cost benefits of remote production are well understood. Although there are still some last mile challenges hindering remotes, they are quickly diminishing and thanks to the growth in 5G networks even more options have become available. At-Home/REMI production is becoming more the norm with network orchestration and redundancy becoming key. Virtual control and production rooms have become more collaborative. Remote monitoring is more crucial and needs to become a priority.

Cloud switching, although accepted and working quite well for certain types of events, is far from mature. Many experts are questioning when this will become the norm for sports due to lack of deterministic feeds and processes along with the power needed for 4K mixing and effects. This points directly for the requirement of cloud-based systems to measure and dynamically adapt and align variable contribution latencies, and will be key to wider adoption in live production.

Virtual audiences have as many detractors as supporters, so with lockdowns constantly happening at random, this won't go away quickly,

Using cloud to replace large editing systems is considered as fairly risky rather than that of bleeding edge.

Distributed Infrastructure

A great example of this is international news organizations connecting to all their bureaus remotely, therefore freeing up news teams on the ground from the creative side, passing on to others anywhere in the world using cloud tools. Having this tighter integration between headquarters and regional bureaus, journalists and camera operators along with metadata assures that when the content comes back, it all matches up. The same goes for home-based activity, however use of these tools demands robust, diverse, secure IT infrastructure, consistent high-speed connectivity, and home UPS systems.

The immediate need to deliver existing services to distributed users combined with the relative immaturity of dynamically scalable cloud-native solutions for many broadcast applications has driven architects to implement less efficient but immediately available lift and shift

strategies. We should expect broadcast vendors to enter a re-factoring phase moving towards cloud-native applications.

Collaboration

Videoconferencing solutions continue to dominate collaborative activities on both a local and global level. The pandemic has created a competitive race to see who can offer the most user-friendly, feature-rich and secure apps for niche media activities.

Many typical board-room media planning and corporate sessions are still struggling with remote collaboration undertakings. Remote content production and broadcast demands are pushing these technologies further including collaboratively produced live shows in multiple locations, even risking 5G only connections.

Cloud

Cloud and Hybrid Cloud solutions are no longer considered as risky. However to get beyond the lift and shift period, to be efficient and environmentally friendly, containerized compute with dynamic and scalable object storage is in early adoption stages as it becomes available for broadcast tool chains. Scalable object storage is a commodity, but performance file services remain difficult to achieve cost-effectively. Cost models and fully scalable storage across various platforms remain a concern. Many vendors don't provide performance models.

Having multiple public compute hyperscalers all working off the same cloud library assets currently doesn't scale well when using multi-edge as part of a cloud deployment. Redundancy strategies are required and broadcast vendors must produce cloud-native solutions to move into a mature offering. Environmental concerns will add to the push for cloud-native solutions.

Compute & Storage

GPUs (graphics processing units) continue to dominate specialized AI servers. FPGAs remain key to low-power niches and network acceleration. Multiple GPU platforms like NVIDIA's Omniverse™ combine broadcast and VFX applications, running on workstations and adding real-time video services to NICs. PCIe Gen5, doubling the speed of Gen4 to 32GT/s (gigatransfers per second), is in very early adoption.

QLC (Quad-level cell flash memory) has the promise of delivering the same performance as we get from high-end enterprise flash storage, however has faster wear that can be hidden to a certain extent with capable flash controllers.

AI/ML-Analytics

Facial/object recognition, camera-tracking and Speech-to-text are solid. An important aspect of AI is looking at network details correlating user data outgoing paths from different CDNs and OTT content, hence figuring out why an outage has happened and avoiding new outages. AI for failure analysis is becoming practical on the back end to make operations and technical systems more efficient.

Deduplication of content through AI/ML analysis identifies the most efficient place to be storing content or moving between storage tiers when appropriate.

AI/ML techniques are now used in sports ball tracking and audio mixing.

Cognitive intelligence is coming into TV sets, which enhances parts of an image depending on what's going on within the scene. ML-based upscaling to 4K is already well established in higher-end consumer televisions and will continue to evolve.

Rather than production companies constantly making content match different viewing devices, AI takes care of this automatically, by understanding screen size limitations, hence filling in the details.

Immersive & Imaging

Simultaneous production of both standard and high dynamic range is quite mature using hardware. The immersive side was on the 'back-burner' as people rushed to remote their operations and their workforces, however by mid-2021, immersive became one of the fastest growing investments. Volumetric capture (RGB+Depth) systems continue to improve in quality/reduce in cost, and when combined with LIDAR-scanned (Light Detection and Ranging-scanned) point-cloud environments, are driving fine-pitch LED walls. LED walls for production continue to improve with techniques like auto-defocusing, atmospheric inputs to line up with the live talent's environment.

AI/ML takes imaging to the next level i.e. creating super slo-mo from standard camera feeds with ML frame interpolation. New generation low light, 4K PTZ cameras with optical zoom are being used by earlier adopters to make their productions more efficient. Having smooth pan and tilt mechanisms, they can be used directly on-air.

Blockchain

We have seen a shift from blockchain being seen as pie in the sky or not yet relevant to media to some early implementations. Of note are new mesh-based innovative techniques that have an alternative approach to CDN-based delivery. It's also being

seen in the area of rights management, being the logical place to take advantage of the inherent advantages of distributing metadata via blockchain.

There is hope that blockchain will assist with parsing out deep fakes. NFTs (non-fungible tokens) using blockchain for broadcast viewer interactivity is in early adoption.

Security

Security must be considered at all stages of product development, deployment and operation. Recent events have accelerated decentralized production and rapidly pushed tools out of the studio and into the homes of staff - secure operations in fundamentally insecure remote contexts. Security processes are still too manual, allowing room for errors and breaches including mistakes and compromises at scale. Moving towards a more containerized universe, authorization of containers needs improvement.

Technologies such as VPN, Zero Trust, Endpoint Protection as well as cloud-based security and tools are applied enabling remote operation and fundamental business continuity across production and business units.

Virtualization

The use of micro-services for multi-platform and multi-cloud environments will be the key for interoperability. Server virtualization is standard for many workloads, although latency-sensitive & graphics-intensive tasks like color correction are slow to embrace virtualization. Advances in virtual GPU and NIC software stacks improve utilization of shared resources. A newer approach is where containers use the same host OS and the orchestration layer, allowing re-use of libraries and other server resources.

Network virtualization allows software-defined network functions to be spun up and down. Newer efficient methods like Mesh Networks and SD-WANs are mature.

Transport & Networking

1, 10 and 100 GbE networks are commonplace, with 25GbE interfaces becoming so. 400 GbE is emerging with 800 GbE in development. The industry drivers are uncompressed low latency live content, live remote production and collaboration.

Interoperable standards and recommendations

(ST 2110, TR-1001-1) with dropping bandwidth costs have enabled IP WAN-LAN convergence. SDN and new orchestration offerings have enabled real time remote production and transmission while driving down production costs and enabling more creative offerings. NDI® 5 has adopted more enhanced capabilities.

CDI (Cloud Digital Interface) allows the transport of uncompressed video inside the Cloud, with high reliability and network latency as low as 8 milliseconds.

Delivery

Aside from live content, OTT is solid and common. AI/ML techniques are improving compression, however licensing isn't standardized. Having video anywhere, on any device, at any time is commonplace, not just expected but demanded.
The push for virtual zero latency continues. ATSC 3.0, NextGen TV and 5G deployments are well underway. Monetization models are still very much in flux. Churn is a constant battle with hope that AI will assist. UHD delivery over satellite is mature in several markets.

Super Trends

Smart media devices pioneered Internet-of-Things (IoT) and now 'Smart Speakers' enabled by Amazon, Google and Apple technologies are quite mature and have evolved as a centralized point of coordination, control and consolidation of increasingly large numbers of diverse consumer IoT home automation devices – with media functions at the core. This signals the emergence of yet another significant paradigm for aggregation, control and monetization of consumer experience.

Esports productions are becoming less of a trend, as they are mature and use standard techniques as high-end sports productions do. There is a solid blur between the crossover of gaming technology and entertainment productions i.e. synthetic productions, camera locked LED walls/ceilings. It may go without saying, however is often ignored: the production of video for Social Media is a must.

Summary

The divide between streaming audiences and linear viewers continues to grow. This being said beyond sports, news and some very strong live entertainment programs, many linear services are repeatedly struggling to attract a full demographic range of viewers. Being a CTO, I consider this because of the great divide between understanding and accepting new technology. Accepting new technology will come with risk, however not accepting new technology comes with a larger risk – which is survival! Hence my top thoughts for 2022, embrace **Hybrid, Interactivity** along with **Security** all while **producing/ publishing compelling programs** by using many of the technologies and trends noted on this roadmap.

Cloud-based tools are making it so easy for producers to connect with viewers now. Solutions that are managed from a web browser from anywhere in the world can seamlessly integrate into virtual production environments

Powered by the audience: How live producers can create deeper interactive viewing experiences

Alex Humphries-French
Head of Content and Communications, Dizplai (formerly known as Never.no)

Dizplai – Did you know that 60% to 70% of viewers have a second screen device on them while watching live content? Social media has a huge impact on live productions. An entertained or informed viewer will discuss what they've watched on social media, and in fact, 41% tweet about the show they're watching, with 76% of those people posting about the show as it's live.

Lots of statistics here, but essentially social media platforms are a huge resource for live producers to not only select and feature live reaction during the programme, but also to extend reach, boost tune-in and enhance opportunities to monetise the content.

Audience engagement for broadcasters and digital content creators is about turning a captive audience into an interactive community. This is becoming increasingly important, as digital live content platforms become more complex, intuitive and interactive. It's no longer enough to simply broadcast to your audience. Modern audiences expect interactivity and agility in their live content they are consuming – as mentioned, most of us watch TV with a second screen device in our hands, so there's a huge resource there to connect with viewers beyond the primary screen.

A valued audience

Channel 4's broadcast of Crufts placed the audience, and their dogs, at the centre of the live broadcast throughout the week of the world's biggest dog show.

Through simple calls to action on screen, and prompted by the host Clare Balding, viewers shared their questions for the guest veterinarian during a live Q&A. The questions were handpicked and featured in graphic overlays for Clare and the Vet to interact with - immediately valuing viewers during the broadcast gave other members of the audience the impetus to get involved.

It started a conversation on social channels and other apps where like-minded viewers interacted with the featured question, further increasing the reach of the broadcast - in fact, Channel 4 saw over 33,000 direct interactions on WhatsApp alone! By making the audience feel that their opinion is valued, they are far more likely to return to future broadcasts and be active in the community, further growing the audience.

Audience-led storytelling

By featuring audience opinion throughout live content, producers can actively allow viewers to influence the narrative of the content. This has two key benefits.

1. A viewer that has their opinion featured will become far more loyal.
2. It provides organic avenues for the presenters' conversation to flow.

BT Sport use live audience engagement tools in their pre- and post-show live content. Jake Humphrey and special guests follow an in-studio screen with a social wall that features questions and live reactions from fans, providing the hosts with key talking points that are in-key to what the viewers want to discuss.

ITV's Martin Lewis Money Show Live is another great example of the audience driving the show. During the pandemic Martin Lewis's prime-time programme was a mainstay on British TV screens. Following a call-to-action on Twitter, viewers shared their concerns and queries about financial issues. The co-host selected popular questions and featured them on a touch screen, directly driving the narrative.

Creating an environment to interact

Global home-shopping network QVC has a successful history of creating a community of viewers.

Whatsapp, QR codes, social media and live data are all part of the interactive viewing experience. Giving shoppers the environment to connect with the live broadcast and access promotions, or share their

reactions, creates loyal customers who are highly engaged. QR codes connect the viewers directly through their mobile devices to special offers, or, direct to WhatsApp, creating a private environment where users interact with the channel directly.

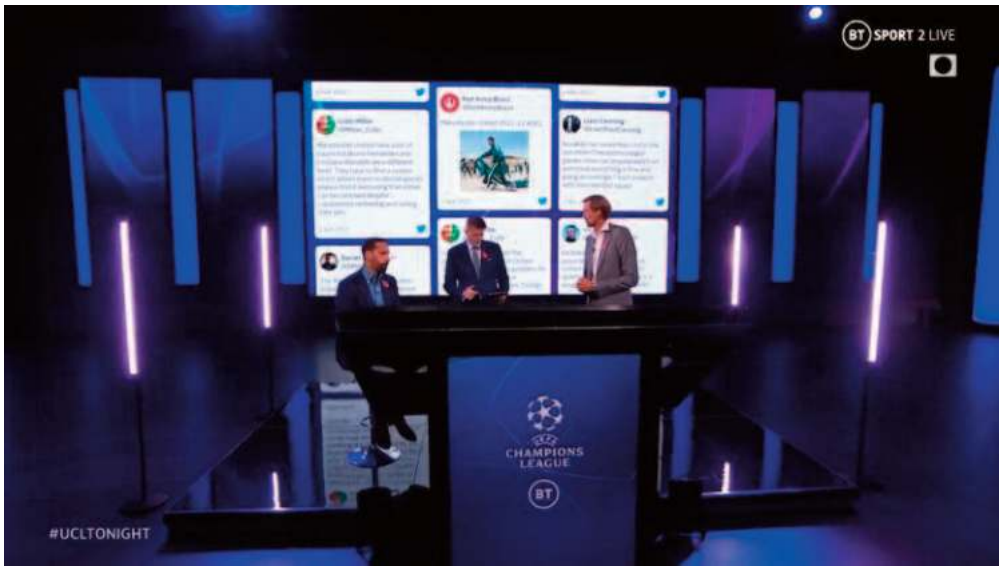
Beyond messaging and social media platforms, interactive web apps are becoming popular too, enabling viewers to interact within an app that's personalised to the programme they are watching. Live polls, quizzes, promotions and much more can also be featured.

Tools to connect

Cloud-based tools are making it so easy for producers to connect with viewers now. Solutions that are managed from a web browser from anywhere in the world can seamlessly integrate into virtual production environments. Creating access to a number of social media platforms, messaging, and even live data sources, that are curated alongside cloud graphics, on any channel, broadcast, or stream.

Broadcasters need to continually adapt to new content and engagement strategies, leading to an acceleration in the need to bring audiences closer to the content. Social data should be the cornerstone of any modern engagement strategy. It's a direct line to the audience's wants and needs, and is a powerful resource that productions teams should be regularly tapping into.

www.never.no



SSD has successfully delivered form/fit/function replacements for SCSI drives that are more thirty years old

Member Speak – **Solid State Disks**

James Hilken
Sales Director, Solid State Disks

Keeping the hardware investment working?

Recording and audio systems are like many other long-life systems that need to be dependable yet need not be updated frequently as we seem to need from our domestic and communications pieces.

Solid State Disks Ltd specialises in the design, development, manufacture and integration of hard disk, floppy disk, and tape drive hardware emulators for legacy systems.

Memory technology has historically been driven by firstly desktop computing, then gaming and mobile communications but is now driven by data servers and cloud computing. Harsh environment customers need to be aware of technology developments but often the latest parts take some time to pass reliability and qualification testing.

Solid state technology is the way to go but often backwards compatibility is the key as new interfaces may require mechanical or software changes and/or system requalification.

There is often a requirement to support specialised computer systems, well into their middle age, which must continue to operate in critical applications and difficult environments. SSD has successfully delivered form/fit/function replacements for SCSI drives that are more thirty years old.

In many cases the operating system and applications software cannot easily be moved to the latest suitable hardware platform or have dedicated safety critical software.

The cost and timescale may be unacceptable and considerable risk and porting to new platforms may also be limited by legacy interfaces and security issues.

These disparate systems often share a common set of four main problems caused, in part, by their specialised nature: -

1. Non-portable Software
2. Hardware Obsolescence
3. Operating Environment
4. The Non- 'Standard' Interface

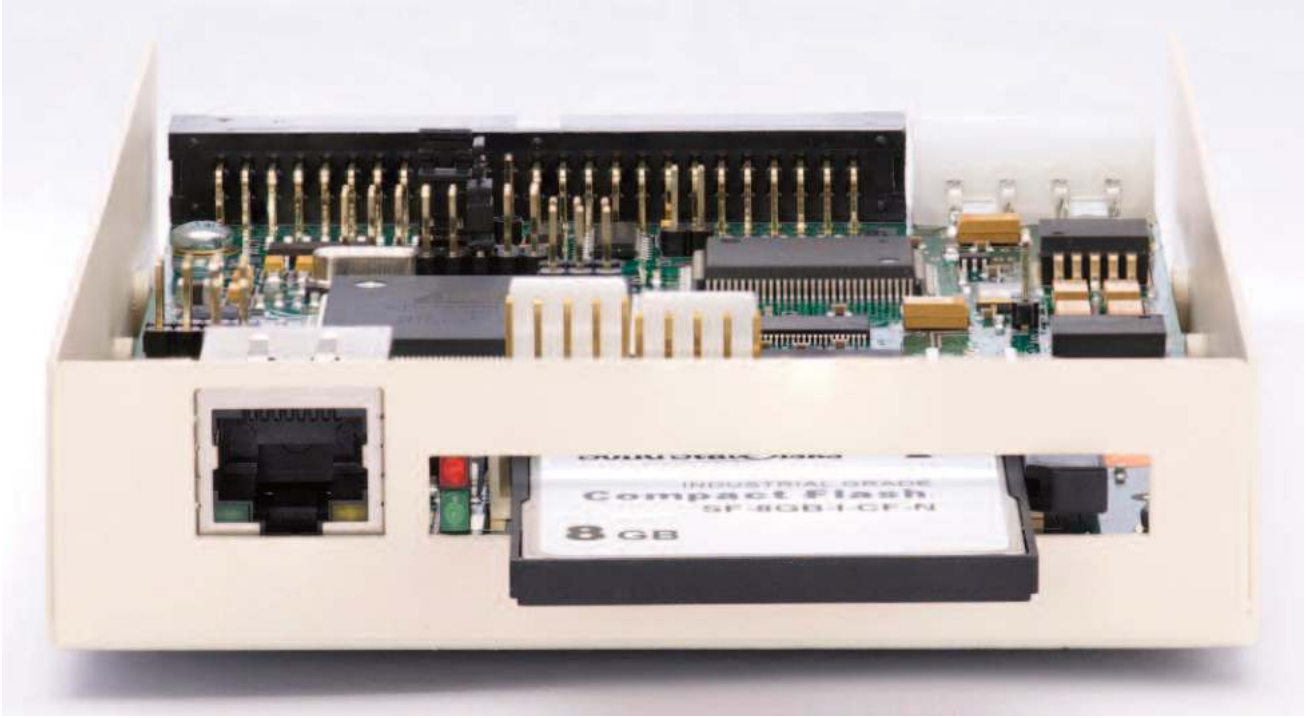
SSD support the development of alternative interface replacement devices to supplement the existing SCSI and IDE ranges. We also offer system level support to engineers using our proprietary technology and technology experience.

Meeting performance is key, and price needs to consider long term servicing costs and contracts that require guaranteed levels of availability. Sustainability and energy consumption in developing new products is also driving new product investment decisions. Businesses have become more cost conscious with reserves and working capital hard hit in recent times despite support from the government in some instances. It is anticipated that life extensions and out of service dates will be extended for reliable systems.

The selection criteria for harsh environment customers must ensure that performance in challenging environments does not induce failures that can have serious implications.

SSD is ISO9001:2000 approved and has over eighty years of combined experience in supporting industries such as Aerospace, Automation, Defence, Energy, Rail, Semiconductor Manufacturing, and telecoms.

To support our customers that rely on the SCSI interface we have developed the SCSI Flash-2



programmable emulator that allows high performance flash to be interfaced to legacy host systems without software change.

We have collaborated with leading customers in key market sectors to provide our networked Touchless Removable® drive solutions.

Customers benefit from access to systems via our Direct Ethernet® port from a host system. This allows data to be kept in a digital library located anywhere within the organisation without the need for physical media.

Direct Ethernet® is also available on our hard disk emulations, which allows a full copy to be remotely taken of a system drive and restored as a bootable image. This dramatically reduces the time taken to rebuild systems after a crash. With the 'Hardware Emulator Solution' it is often possible to prolong legacy system life, and increase performance, reliability, and environmental immunity, by identifying and replacing the high-risk hardware elements. For hard disk, floppy, and tape this can be done by emulating their function directly at the legacy interface level (plug compatibility) and using industrial grade Flash, e.g., Compact Flash (CF), for data storage. This also offers significantly lower cost.

If your legacy support problem is a good fit with our solution, the first step is to contact us providing as much information as possible about the application, the target product and system, and the host interface to be emulated.

SSDL can provide "Emulation Questionnaires" to assist with this process. In many cases a match will be found with a product from our range, or a small adjustment will allow compatibility to be achieved. In other cases, a feasibility study may be required, followed by the design and manufacture of a dedicated solution.

We have already delivered solutions for customers like Century Link, Dolby, Exxon Mobil, Nokia, Orange, Telefonica, and Verizon.

If you would like to know more please contact me at **ianblackman@solidstatedisks.com** or visit the SSD website **Solid State Disks Ltd (SSD) – The Industrial Division of the Reactive Group** or our LinkedIn group **Solid State Disks Ltd: Company Page Admin | LinkedIn**
Several educational videos are also available on You Tube.
How can we help you?

Headquartered in Palma, Spain, and Los Angeles, USA, farmerswife has become the leading provider of resource scheduling, project management & team collaboration software

Member Profile – **farmerswife**

Our story begins in 1999, when Mads Linden (co-founder of Chimney Pot, Sweden) could not find a product that solved their problems with managing resources, projects and people in a unified way. Mads picked up a book and the decision was made to start developing what today has become farmerswife – the scheduling system of your dreams!

But why are we called farmerswife?

Back in the day our company was located in a typical small town, perched on a hilltop, right at the heart of the well-known and beautiful island of Mallorca, in Spain. Inspired by this, and in commemoration of the amazing work carried out by the farmers from surrounding areas, we decided to name our software 'farmerswife'. But, why wife? Well, traditionally in a farm, even though every member of the family cooperated, the farmer usually took care of the animals, plants, and harvests, while the farmers' wife took charge of the finances, organization of resources and selling the products.

More than twenty years later, headquartered in Palma, Spain, and Los Angeles, USA, farmerswife has become the leading provider of resource scheduling, project management & team collaboration software for the demanding needs of today's media industry.

With clients in production, post-production, broadcasting, equipment rental, agencies, and education we offer a scalable solution that helps you manage your projects and teams. The software is used worldwide by companies from small to large such as Apple, Disney, Warner Brothers, BBC, ITN, SBS, Spiegel TV, Hogarth, and Nordisk Film.

Our collaborative platform enables you to organize and track project resources, plan, and control the project lifecycle, manage day-to-day tasks, create customized budgets and analyze financial performance in a practical way that drives better decisions.

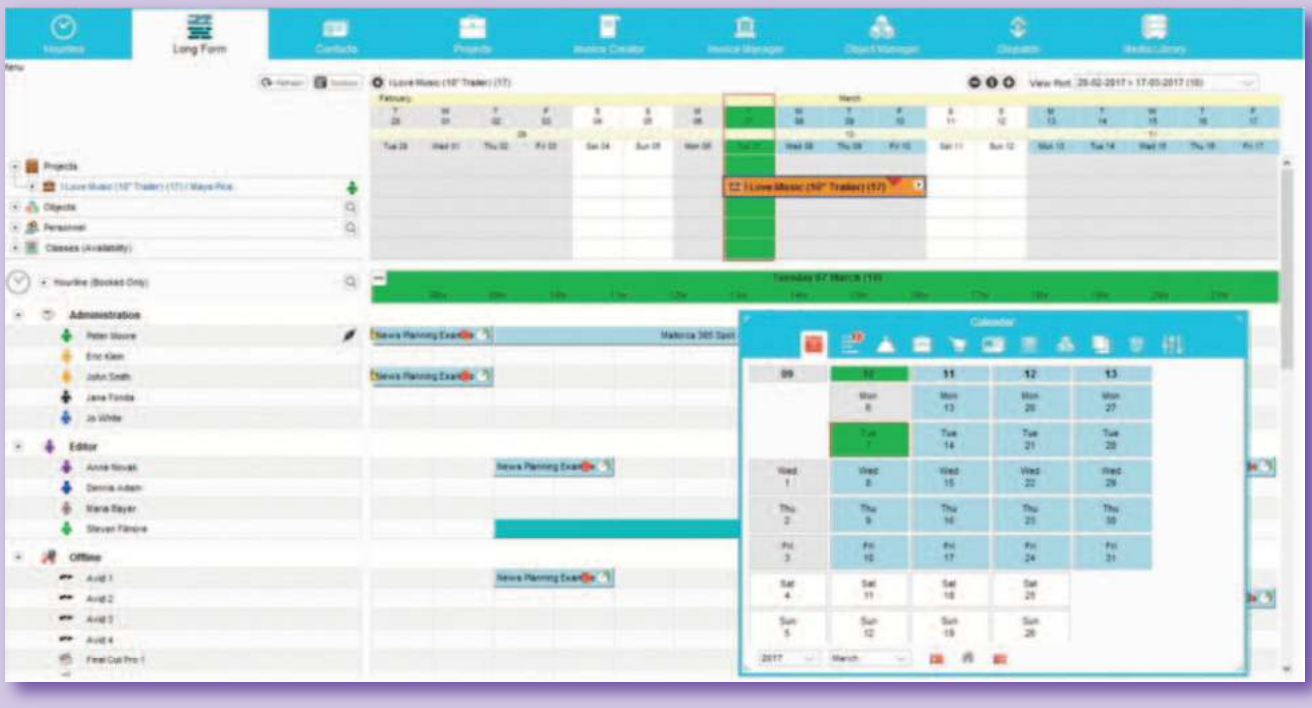
farmerswife is always evolving. Learning from the past 22 years we have grown deep roots of experience and constantly adapted to the media industry's needs. From these needs Cirkus was created, designed to address the specific project needs of media organisations. Cirkus is the fresh way to help you and your team get work done. Available as both an integration for farmerswife, or as a standalone product, Cirkus has been built to reflect and adapt to the way teams work and collaborate in the real world. It allows users to schedule, assign and manage projects and tasks; track status and report time; and collaborate efficiently with anyone, anywhere by coordinating resources and sharing files in one central hub.

It offers all the project and task management features that you'd expect like due dates, reminders, assignees, comments, recurring tasks and file attachments, as well as advanced features such as project templates, custom fields, and task triggers that support complex, repetitive workflows. Teams and collaborators use Cirkus to make collaboration simple and complete. Linking back to farmerswife gives the full picture to control costs and invoice for the work completed.

Our highly experienced multilingual and responsive team provides the bedrock on which our products can take root and flourish. The farmerswife team has a wealth of experience supporting and implementing postproduction workflows.

farmerswife is the proven engine for complex projects and financial management demands. While Cirkus is an elegant and simple day to day task collaboration tool for teams.

Together, farmerswife and Cirkus solve your company's needs, end to end!


Long Form
Administration
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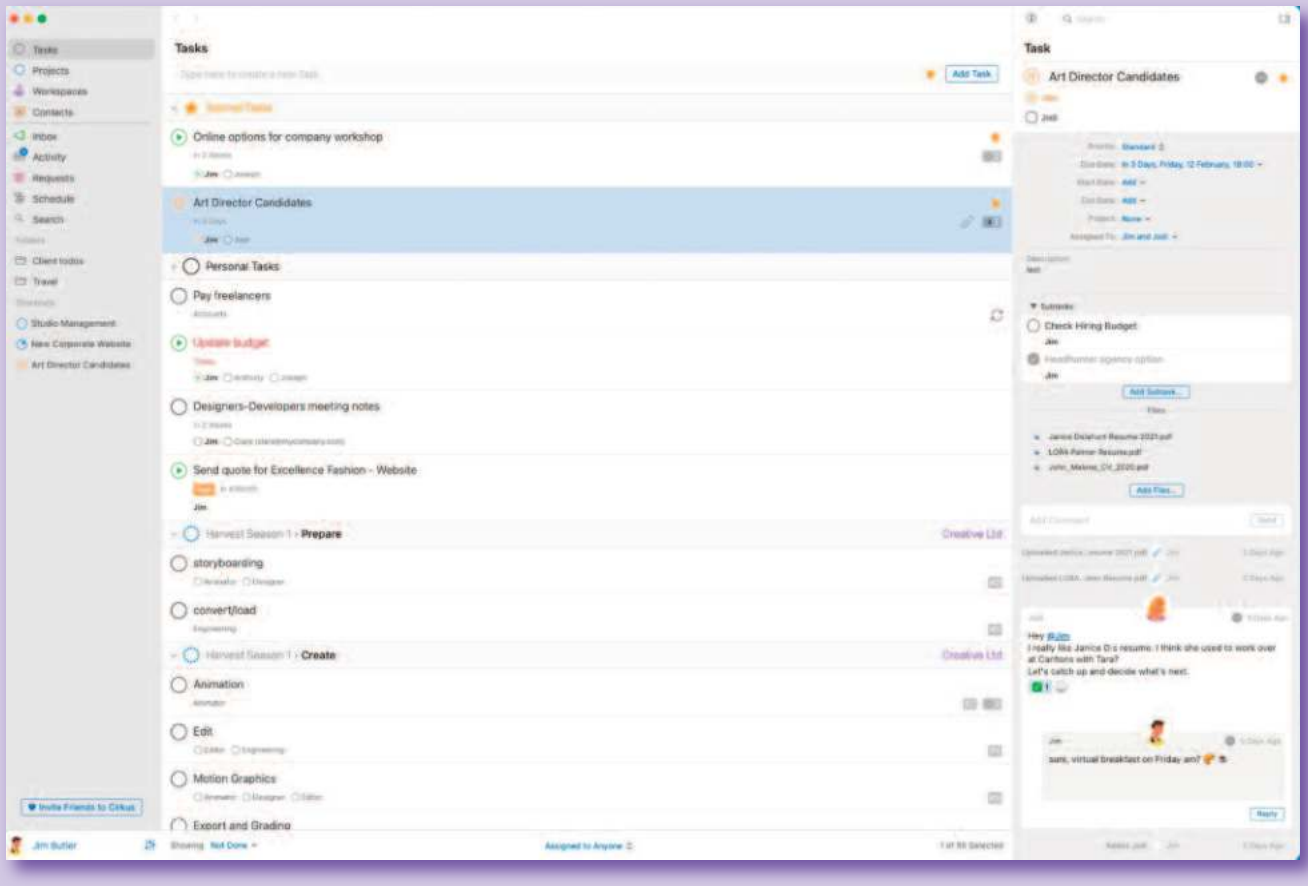
Offline


Tasks
Projects
Workspaces
Contacts
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Activity
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Schedule
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Client todos
Travel
Studio Management
New Corporate Website
Art Director Candidates
Invite Friends to Cirkus
Jim Butler
Tasks
Add Task
Online options for company workshop
Art Director Candidates
Personal Tasks
Pay freelancers
Update budget
Designers-Developers meeting notes
Send quote for Excellence Fashion - Website
Harvest Season 1 › Prepare
storyboarding
convert/load
Harvest Season 1 › Create
Animation
Edit
Motion Graphics
Export and Grading
Assigned to Anyone
Task
Art Director Candidates
Check Hiring Budget
Add Subtask...
Add Files...
Reply

More than 2.500 promos were generated fully automatically in just 20 days, for multiple geographies, time zones and languages

New Member – **Embrace**

Julien Gachot
Co-founder and CEO, Embrace

Embrace, a French software vendor that automates systems and connects people, happily joins the IABM community!

Embrace produces software designed for the content creation industry that helps solve operational workflow pains by implementing user-centric solutions.

We offer solutions that automate repetitive tasks and simply connect people with business processes and systems to unleash creativity, improve operational efficiency and control.

We invite our customers to welcome digital transformation positively, for their own performance.

Founded in Paris, France, in 2015, Embrace tirelessly assists leading media groups internationally to streamline their operations, empower their best creative talents and enhance the overall quality of their work leveraging the three solutions that the company brought to market.

- **Automate-IT** – Leading promo versioning platform Executing, assembling, and delivering promos methodically, on time, every time and at scale.
  API and data-driven, Automate-IT streamlines the generation and distribution of videos with graphics for broadcast and social media in any editorial and technical context.
- **Share-IT** – Adobe and Avid collaboration
  Share-IT simplifies the collaboration between Adobe graphics products – namely Photoshop and After Effects – with Avid MediaCentral. Searching and outgesting content from the PAM and publishing back simply and securely to the Avid production environment uniquely with alpha channel. Sorted.
- **Pulse-IT** – Media supply chain orchestration
  Pulse-IT enables users to translate, optimize, execute, and monitor their video supply chain processes and workflows leveraging the low code approach.

Our open API products are heavily used 24/7 by leading media groups such ABC News, A&E Networks, Arte, BeTV, Canal Plus, Eurosport-Discovery, Nine Networks, Orange, Red Bee Media, RTL, TF1...

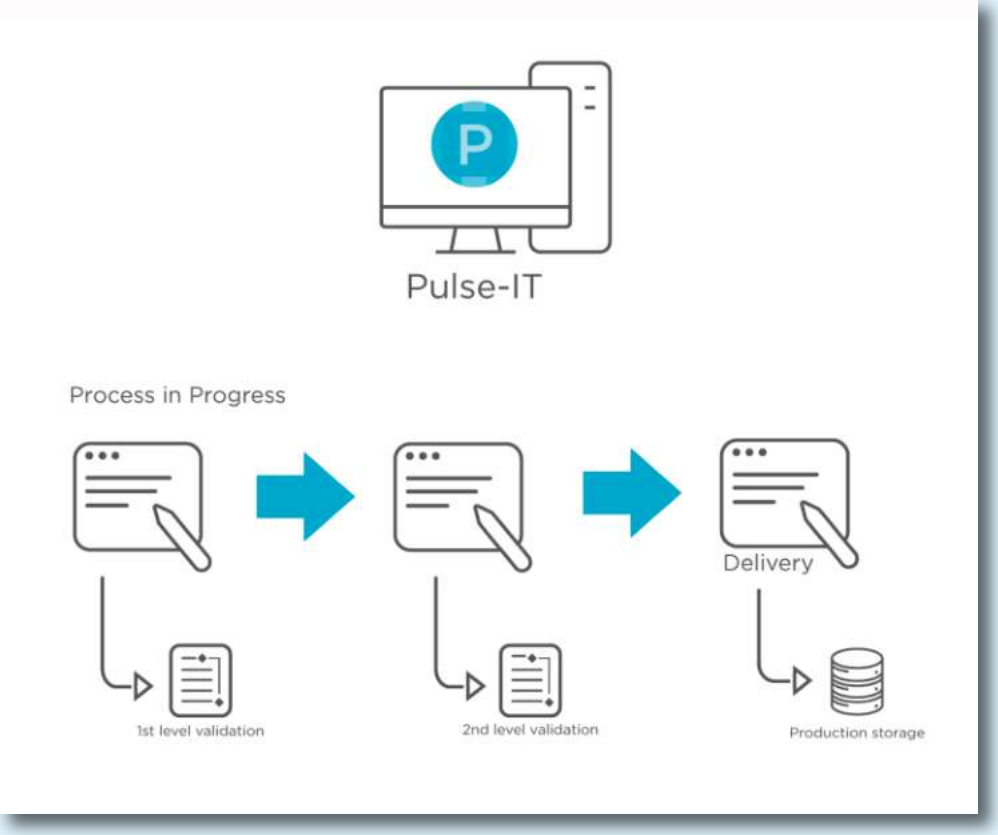
2022 Olympic Games promos were packaged and distributed automatically from AWS.

More than 2.500 promos were generated fully automatically in just 20 days, for multiple geographies, time zones and languages.

Automate-IT guarantees the strict compliance with the corporate branding of clips going on air.

Pulse-IT is a low code platform designed to simplify and automate ingest tasks, quality control, distribution, and media processing, on premise or in the cloud, and enables adoption of emerging technologies such as AI and ML.

It is possible and simple to design any workflow needed in minutes and connect users (via HTML panels) and systems (using low code) without having to rely on professional services from us.



Media organizations often struggle to implement digital transformation projects in a practical, flexible, and scalable way. Too often, they end up with multiple standalones, short-term solutions with lengthy development cycles, high costs, and disappointing results.

At Embrace, we strongly believe in customer sovereignty. Hence the choice of developing our tools with a low-code philosophy allowing media & entertainment users with limited programming skills to implement sophisticated workflows on their own. Low-code combined with user-centric design enables translation of business needs very quickly into media-oriented workflows with immediate and positive adoption by users.

In addition, the Embrace Engineering team is constantly working to improve and adapt its products to the needs of its users. Currently, a new version of these products integrating innovative features which will be a real asset for the media industry, has just been released. The V3 major release increases the user's experience for greater efficiency, easier collaboration, and perfect integration with other technologies.

Embrace will have a presence at the NAB Show 2022 on the French Pavilion (stand W7416) where major updates for all products will be revealed to improve efficiencies, simplify collaboration, and ease integrations with any modern third-party technology. Please write to contact@embrace.fr to schedule a time at the show to meet and greet or visit **www.embrace.fr** for more information.

85% of viewers give up streaming if their content is taking too long to load; some figures place this at 2 seconds

New Member – **Varnish Software**

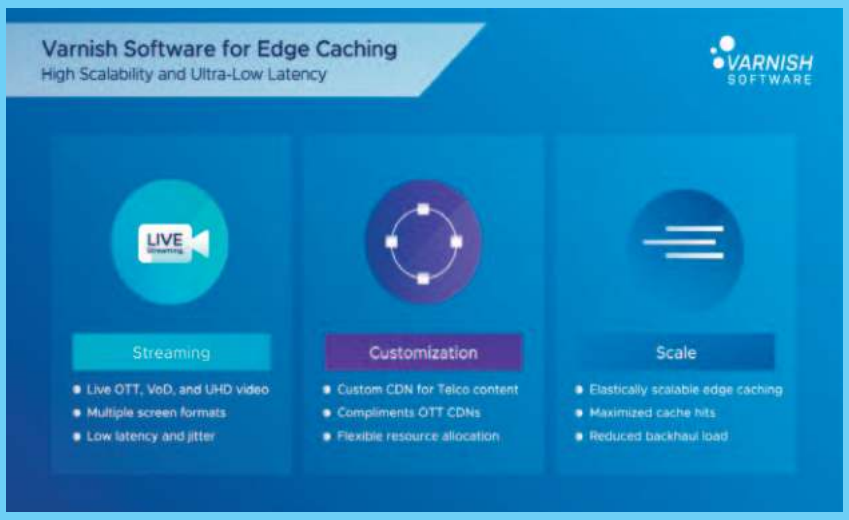
Adrian Herrera
Chief Marketing Officer, Varnish Software

Consumers demand immediate access to content, whether it's streaming live sports, watching a season finale on demand, shopping online or reading breaking news. They could be anywhere in the world, on any device, and they all expect instant, latency-free web and media experiences.

Heavy traffic affects performance and can cause downtime, meaning that content providers need advanced solutions for handling rapidly increasing demand, scaling to match audience sizes while minimizing latency and avoiding spiraling bandwidth costs. Companies are already operating in a streaming-first future, in which:

- Live video makes up 17% of all internet traffic by 2022
- 80% of consumers prefer live streaming video to reading
- 67% of streamers cite quality as the most important factor when live streaming video
- OTT platforms with lower-quality videos risk of losing about 25% of their revenue

Varnish Software solutions are here to help. Varnish combines open-source flexibility with enterprise robustness and support to speed up media streaming services, accelerate websites and APIs, and enable global businesses to build custom content delivery networks (CDNs), unlocking unbeatable content delivery performance and resilience. Since 2010, Varnish's powerful caching technology has helped the world's largest content providers to deliver lightning-fast web and streaming experiences for huge audiences without downtime or loss of performance.



Balancing content control and scale

Any business relying on content delivery performance and availability knows the steep cost of latency and downtime:

- 85% of viewers give up streaming if their content is taking too long to load; some figures place this at 2 seconds
- 75% will abandon a service altogether if they experience buffering issues several times
- 90% increase in bounce rate when web page load time goes from 1 to 5 seconds

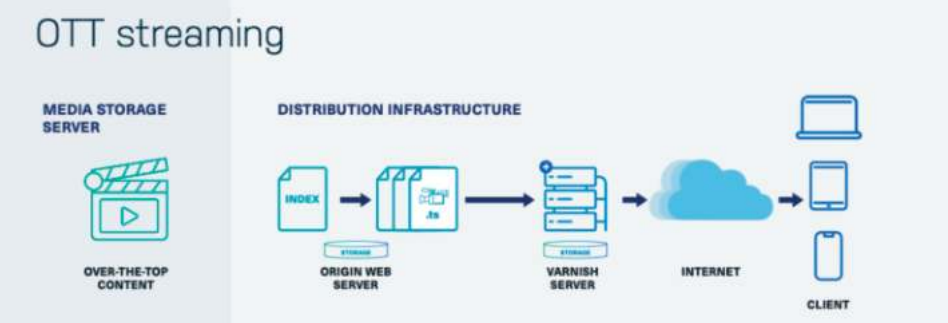
These statistics are accepted standards in the industry and illustrate how critical web performance is to the bottom line: gaining, retaining and satisfying customers and users, whether they are making a purchase online or streaming the most popular video.

The challenge for many content-driven organizations is that they have existing content delivery approaches that are inflexible or completely rely on commercial CDNs and cloud services. Issues arise with both. On one hand, these solutions can be difficult to scale. Adopting commercial CDNs and cloud technology make scaling easy but make it difficult to predict costs and almost impossible to scale back.

Taking control of delivering content with caching and private CDN software

Achieving high-performance content delivery depends on caching, optimizing infrastructure and making content available as close to end users as possible. This is where companies can seize control, make maximum use of intelligent caching and edge computing, and customize content delivery for the needs of their audience.

With Varnish solutions, companies can choose their own path and control their content delivery. Organizations can augment their large-scale commercial CDN solution for greater resilience by adding a private CDN for origin shield. They can also build a multi-CDN strategy to serve growing global audiences to optimize for unique use cases, unpredictable traffic, and geographical needs. In addition they can set up 5G edge CDN nodes to facilitate enhanced video (4K, 8K video), live streaming of events, gaming, augmented and virtual reality, and much more. This is all done taking a software-defined approach on bare metal, in the cloud, or on Kubernetes that eliminates vendor lock-in.



Powering high-performance content delivery and reducing data center footprint

Varnish Enterprise is designed specifically for these increasingly complex and demanding content delivery challenges. With uniquely flexible web and API acceleration, private CDN/origin shield and streaming solutions, designed for helping content providers of all kinds stay competitive at scale and provide great web and streaming experiences to huge audiences, all day, every day.

At the same time, Varnish innovation strives for ways to push technology to meet future demand while balancing costs and the carbon footprint. Being able to achieve 500 Gbps throughput per server, as Varnish has done with partner Intel, demonstrates the viability of pursuing high-performance content delivery solutions that can significantly reduce the data center footprint in an increasingly environmentally-conscious world.

Varnish Software is one of the newest members of IABM

Varnish Software has recently rejoined the IABM network, with the aim of sharing our experience and expertise in sustainably optimizing and customizing content delivery for virtually every use case. We have focused on ensuring unrivaled performance since 2005 when we first launched the open source Varnish Cache project, which is used by over 18% of the world's top 10,000 sites. We have continued to innovate, adding a full commercial private CDN software stack so that organizations of all sizes can have granular control over the end-user experience while controlling costs. As consumer expectations continue to grow, we will continue to offer flexible solutions for ensuring that these media streaming and content delivery expectations are exceeded. To learn more visit us this year at NAB in the West Hall at booth 7706 (W7706). We welcome the opportunity to discuss unique content delivery challenges across industries.

Read more: **www.varnish-software.com**

New Member – **SwXtch.io**

swXtch.io has created a high-performance network technology, ***cloudSwXtch***, that implements features that are not available in the cloud. ***cloudSwXtch*** can run on all public clouds, connecting high performance data flows – including uncompressed UHD video streams – between clouds and within clouds. ***cloudSwXtch*** creates a single data plane across disparate cloud and on-prem networks allowing media companies to simplify their cloud migration, implement their multi-cloud plans and build redundant paths for critical content.

cloudSwXtch approaches the performance of bare metal 'top of rack' IP switches.

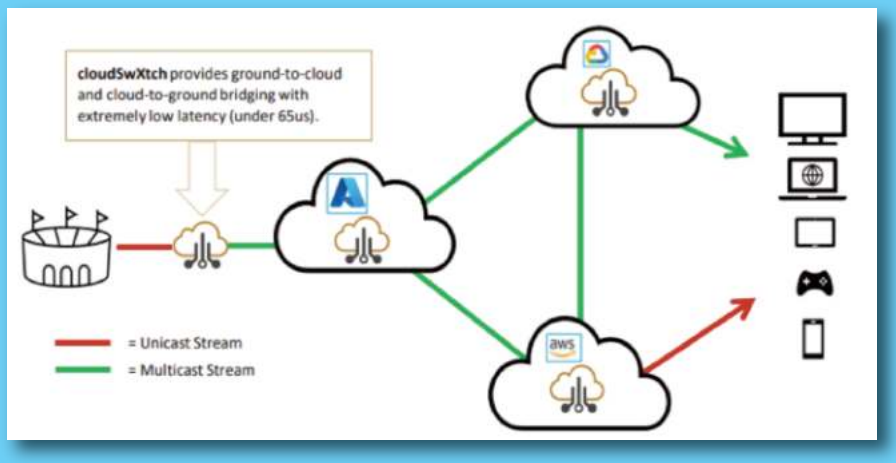
- Unlimited network and ***cloudSwXtch*** scaling; create a 1,000+ port swxtch
- Create a mesh network by combining multiple ***cloudSwXtches***

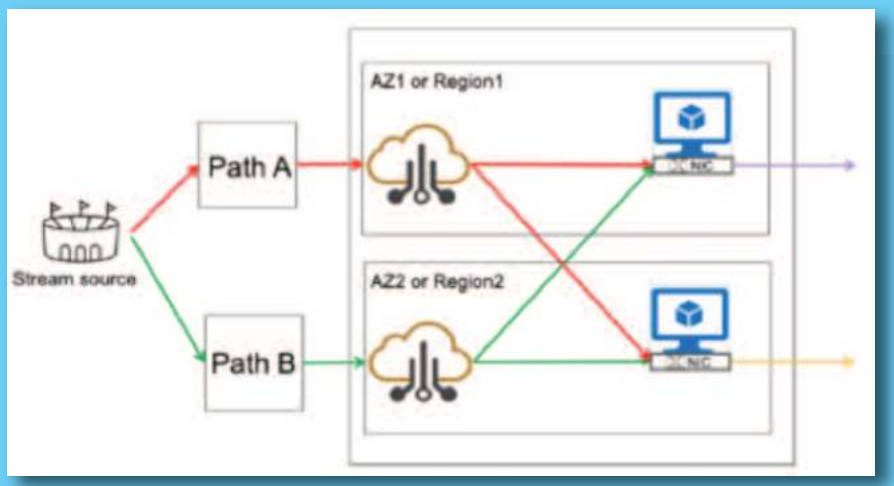
The network above is a conceptual representation. All streams can be unicast or multicast depending on requirements.

cloudSwXtch adds critical features that are not available on cloud networks.

Multicast: ***cloudSwXtch*** enables high performance IP-multicast on cloud networks. Using multicast instead of unicast optimizes your network configuration and reduces your cloud distribution and egress costs. In addition, receivers can dynamically subscribe and unsubscribe to your streams as workflows dictate. ***cloudSwXtch*** eliminates having to configure and unconfigure unicast streams to accommodate configuration changes.

Protocol Fan Out: ***cloudSwXtch*** can fan out non-multicast packet protocols in the same way that multicast does. It can forward a unicast stream to many interested receivers or distribute a multicast





stream to many unicast devices. This integrates unicast and multicast workflows in a way that hasn't been possible in the cloud.

SMPTE 2110 Uncompressed Workflows: ***cloudSwXtch*** has SMPTE 2110 support without the necessity of additional Gateways or other on-ramp/off-ramp appliances. The ***cloudSwXtch*** architecture is designed to treat content the same whether it is compressed or uncompressed. This means the ingest of streams from on-prem to the cloud and the streaming of content within the cloud, whether unicast or multicast, is the same regardless of the content type. No SDK is required for uncompressed video, and the cloud network becomes an extension of the broadcast network.

SMPTE 2022-7 Hitless Merge: ***cloudSwXtch*** SMPTE 2022-7 Hitless Merge protects against data path failures by sending the same stream via two data paths. It compares packet reception from the multiple streams, detecting dropped packets, and reconstructs the output stream in the correct packet order.

Coupling hitless merge with redundant media workloads ensures high availability uptime for critical content and provides a new method to create highly available Disaster Recovery pathways in and between clouds.

Packet visibility is one of the casualties of moving to cloud networking. ***cloudSwXtch*** includes Monitoring and Quality of Service (QoS) tools that provide new insights into your data flows.

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ORTANA Media Group

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Audio, Video & Control Solutions

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