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Smart Content

*Improving Consumer
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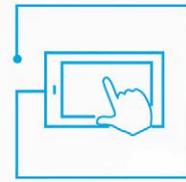
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The Media & Entertainment Services Alliance (MESA) was founded in 2008 to advance the creation, production and distribution of media & entertainment. On behalf of its membership, MESA produces events, newsletters, research, as well as this journal publication. Its industry initiatives include communities in supply chain, 2nd screen, information technology, content protection and smart content. MESA is the management company responsible for the efforts of Content Delivery & Security Association (CDSA), Hollywood IT Society (HITS), Women in Technology:Hollywood (WiTH), Smart Content Council and 2nd Screen Society.

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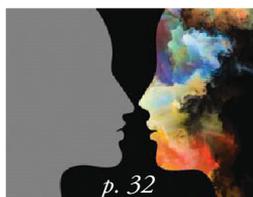
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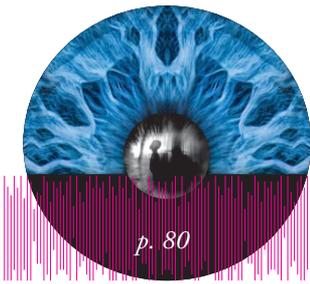
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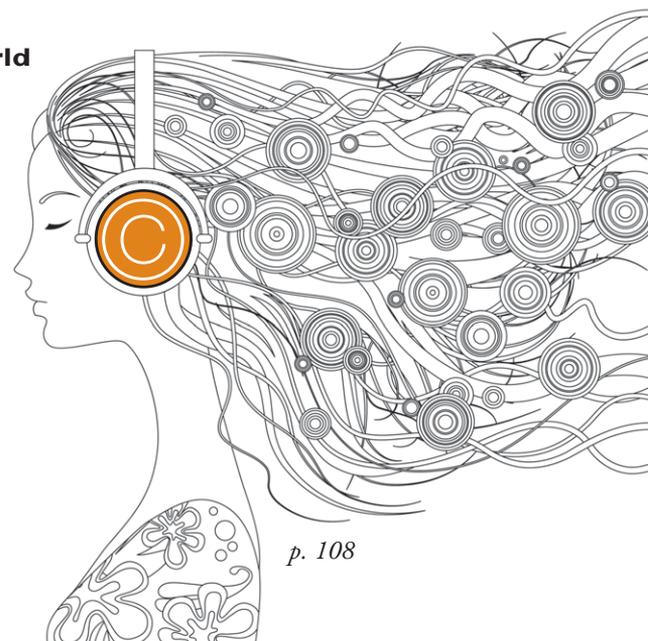
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to **Production Data**.

BRIDGING THE GAP



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Technology is Upending the Digital Supply Chain of Hollywood

By Devendra Mishra, Chief Strategist, MESA



The internet is helping content owners build a direct relationship with consumers

The supply chain of the M&E industry, in terms of infrastructure, information connectivity and workflow, is not only coming of age with digital technology, it is being transformed from a series of traditional business-to-business relationships with trading partners (B2B) to an increasingly direct-to-consumer vehicle (B2C).

Technology is the enabler of this transformation: The internet serves as the ubiquitous, inexpensive distribution channel with global reach. Cloud computing and networking enable innovative business models. Digitized content moves through automated workflows. Smart phones and social media directly connect content owners with consumers seeking entertainment.

Moving from B2B to B2C

In the past, a studio executive understood the pulse of the consumer through point-of-sale (POS) data from cash registers for DVD sales; Nielsen Ratings from black boxes in households that shed light on TV viewing habits; intelligence gathered from market research, consumer surveys and focus group studies; demographic characteristics from census data;

and purchasing behavior from consumer credit agencies. This traditional structure of the industry, in which Hollywood studios rely on intermediaries for content distribution and feedback has been a handicap. It has allowed “middle men” including digital distributors, telecom and satellite delivery companies who deliver licensed content from Hollywood to “own” the consumer relationship. Studios, with the exception of The Walt Disney Co., have not been successful at establishing the consistent brand imagery necessary to connect directly with consumers. But today, the technologies of mobility and social media have are helping the studios begin to establish a B2C relationship.

Putting new workflows to work

In addition, the studio silos of creation, production, marketing and distribution of content have been enhanced by collaboration with the successful deployment of technologies that enable real-time sharing, evaluation, editing, information linking, storage and metadata sharing with all the internal enterprise stakeholders. Production executives are beginning to embrace the capturing of metadata for the benefit of ultimately enhancing consumer engagement. Legal and business development professionals are furthering sales to new foreign territories by having their technology partners localize content and marketing collaterals along with integration of digital rights management with avail information for content.

Across M&E, CMOs, CIOs and CTOs are utilizing technologies to better understand consumers, influence their behavior, introduce new products, optimize advertising in-

vestments, better manage brands and reinvent businesses. Many aspects of the physical links of story development, pre-production, production, marketing and distribution of film and TV have been replaced by digital building blocks in which greater efficiency, time compression, quality enhancement and security are achieved. This internal digital supply chain of a studio is extended to the business partners on the supply and delivery sides, creating an integrated, extended ecosystem. The result is a quantum increase in the entropic value of the M&E industry.

The growing impact of distribution

Hollywood has recognized that while excellence in products drives business success, the impact of distribution may have an even greater impact. As a result, it is providing simple, secure, powerful, integrated and user-friendly ways to create, consume, purchase, share and manage content. The acquisition of NBCUniversal by Comcast and the pending purchases of Yahoo by Verizon and Time Warner by AT&T are precursors of the realignment of the M&E industry to build upon consumer-centricity, with others to come. The networks and studios have built vibrant platforms including HBO GO, CBS All Access and Crackle to foster symbiotic and mutually beneficial relationships with users, customers, partners, vendors, developers, and the community at large. The resultant consumer feedback impacts both the studio offerings and consumer choices.

Tools for consumer insight

In the New Age, digital marketing is led, not

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Devendra Mishra is recognized as an eminent thinker and practitioner of supply chain management. He has previously served as President/COO of such companies as LIVE Entertainment, VCL-Carolco, Lieberman Entertainment and Technicolor Worldwide Media. He has also taught as adjunct Professor of Decision Sciences at Pepperdine University.

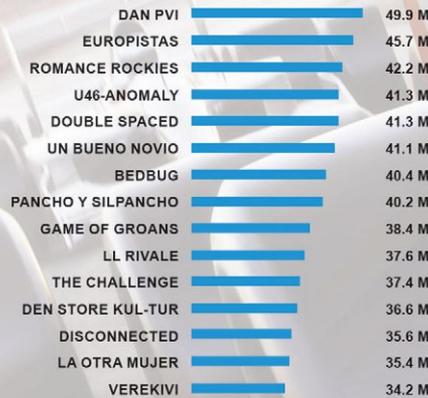
FUELING YOUR COMPETITIVE ADVANTAGE WITH EXECUTIVE DASHBOARDS THAT DRIVE YOUR IP PERFORMANCE

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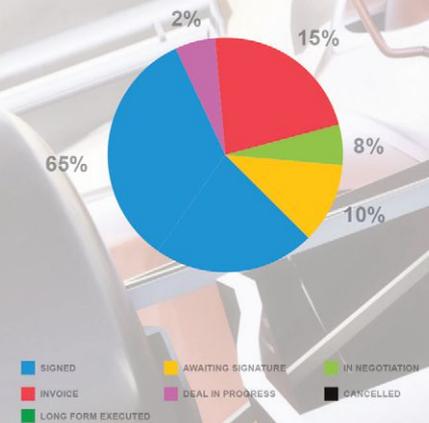


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Nothing is Artificial About AI

By Guy Finley, Executive Director, MESA



M&E companies will need to creatively exploit the benefits of IoT to gain the full benefits of AI

Brace yourself for the next wave of technology – the M&E industry is expected to be one of the prime business and consumer beneficiaries of artificial intelligence (AI). By AI I'm including many different disciplines such as machine learning, auto-recognition, language processing and any number of technologies being leveraged to advance workflows or processes beyond what the human mind can now perform (or even conceive!).

In a business like ours, one that is fundamentally built upon images and a wide variety of personalized content, the need for a smart and powerful engine that can manage our content frame-by-frame and help us touch a hyper-targeted audience segment is not simply a required spend but a significant investment in our industry's future.

In the \$5 billion AI industry that will be flourishing by 2020, the media and advertising sector is expected to hold the largest AI market share per a recent MarketsandMarkets (M&M) research report. Imaging and speech recognition, two key components to our product workflows and consumer experiences, will be that new AI industry's key applications.

Innovations like Siri or Nest and other Internet of Things (IoT) devices are already introducing AI to our consumer customers, while offering our production and distribution net-

works an unprecedented and direct feedback loop of consumer data that currently barely scratches the surface of what M&E businesses will soon be able to do with AI-enabled business processes, partners and products.

Of course, plenty of work still needs to be done on the industry level. Ernst & Young (EY) reported in a June 2016 report that M&E companies will need to creatively exploit the benefits of IoT to gain the full benefits of AI. Location data and sensors, the report indicates, will provide especially valuable sources of feedback, allowing producers to fire up exactly the right content for the right audience and locale.

The upshot of the EY report is that M&E companies will need to create entirely new media experiences based on these new IoT consumer machines, which will be necessary to excite consumer interest and maximize engagement. Sensors will automatically activate more contextually relevant content recommendations and personalized promotions. AI will allow consumers to automatically connect to their content and narrow the field of choice with the best possible recommendations. Data from wearables, meanwhile, will provide unparalleled media consumption metrics, which will supersede today's questionable sample-based measurement systems.

The companies that will ultimately dominate this brave, new, AI-enhanced M&E experience are already some of our industry's leading partners: IBM's Watson, Facebook's Imaging Tagging, Microsoft's Cortana, Apple's Siri, Amazon's Alexa and Google's 'OK Google' – not to mention Netflix's powerful, proprietary recommendation engine. With video at the core of all these companies' business strategies, and with our industry now on its way to a functional metadata schema, AI-powered speech recognition devices and smart remotes will greatly improve today's ambiguous and imperfect video and data search functions. Our automated content management and distribution systems will become increas-

ingly powerful and easy to feed.

Will the machines ultimately replace our industry's content creators? I personally believe that the producers, writers and directors who drive our content can rest assured that their jobs are still secure, though some interesting research in AI in media is happening at Google's DeepMind project in London. Their researchers are teaching computers to read and, in turn, generate news stories by themselves. One can only wonder how far off AI-enabled or generated video content will be? At a *Wall Street Journal* conference last fall, Facebook demonstrated an experimental camera app that uses AI to convert live video into recognizable works of art. The company's style-transfer technology lets a user convert any image into the style of artists like Van Gogh, Monet or Rembrandt. Could the work of brand-name cinematographers or directors be far behind?

Meanwhile, Alex Da Kid, a Grammy-winning producer, used massive amounts of information collected by IBM's Watson to compose his cut "Not Easy," in collaboration with X Ambassadors, Elle King and Wiz Khalifa. Watson fed the artist five years of news analysis from the front page of *The New York Times* to come up with leading cultural news trends, which was combined with feedback from social media that let him know how the public felt about these stories, and then Watson combined this data with lyrics and chord progressions from thousands of other pop songs to help the artist come up with his final composition. The artist told a radio interview recently that he usually begins his creative process by talking to his collaborators and in this case the conversation was actually between him and a machine that could give him an acute "understanding of how people talk to each other on a massive scale."

How will AI change the business of M&E? One other example is the impact it

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Save these dates to engage with our communities in 2017:

	<p>Event: HITS NYC When: February 15, 2017 Location: Microsoft Technology Center, Midtown Website: HollywoodITsummit.com/NYC</p>
	<p>Event: SMART CONTENT SUMMIT When: March 9, 2017 Location: Luxe Sunset Blvd. Hotel, Los Angeles Website: SmartContentSummit.com</p>
	<p>Event: WITH WORKSHOP When: March 9, 2017 Location: Luxe Sunset Blvd. Hotel, Los Angeles Website: WiTHollywood.org</p>
	<p>Event: TAKE THE DAM(N) TOUR When: April 24 & 25, 2017 Location: Las Vegas Convention Center Website: MESAlliance.org/TTDT17</p>
	<p>Event: MESA LAS VEGAS (Member Reception) When: April 25, 2017 Location: 1 Oak in the Mirage, Las Vegas Website: MESAlliance.org</p>
	<p>Event: HITS: SPRING When: May 25, 2017 Location: Sheraton Universal Hotel, Los Angeles Website: HollywoodITsummit.com/spring</p>
	<p>Event: MESA @ E3 When: June 14, 2017 Location: Luxe City Center Hotel Website: MESAlliance.org/E3</p>

MESA's mission is to support entertainment service providers in building efficiencies in the creation, production and distribution of physical and digital media & entertainment.

5 Keys to Successful Transformation in Media Businesses

By Christy King, Strategic Consultant, MESA



Focusing on technology as an end is a trap; technologies should be the evolving tools of smart business strategies

Digital success isn't all about technology. Most of us know—through painful experience—that change for the sake of change doesn't help us reach new revenue or automatically reduce costs.

Nicholas Carr argued many years ago in his *Harvard Business Review* article "IT Doesn't Matter" that unless a technology is proprietary to a company, it ultimately won't provide competitive advantage on its own. Most media solutions will become available to all and thus provide no inherent advantage. The trap to avoid, according to Carr, is focusing on technology as an end in itself. Instead, technologies should be the evolving tools of smart business strategies. And that requires a company culture that supports people in a near constant state of change.

There are key tenants that can help your

company leaders judge technology opportunities with a consistent, critical eye.

■ *Does the technology change require that both new employees and existing employees change the way they work?*

If so, the technology change will require significant time-consuming communication and executive support for success. Staff affected must clearly understand how this major change will help their group, and their company, reach a pivotal business KPI. Equally important is to plan for failure. How can your staff safely communicate setbacks, without being labeled a resister of change?

■ *Does the new technology isolate or ignore existing systems or data?*

If a new technology is replacing a previous system or process – that is a different kind of experience. But beware the fancy new tool that doesn't have the ability to take in data from other systems or acknowledge other systems already being used.

■ *Does the new tech drive a digitally mature strategy for the company?*

Less mature ideas focus on solving single-issue process problems. More mature ideas are developed within a wider scope of company transformation. These ideas are not mutually exclusive, but rather a checkpoint for judging digital solutions presented. Today it is still common for a department within a media company to propose a solution to a problem that is only "their problem." It is still seen as "polite" to stay out of other people's business. However, media

companies cannot perpetuate that isolationist culture any longer. Cross function groups must be encouraged and rewarded in communicating and proposing solutions that attempt to solve problems across departments.

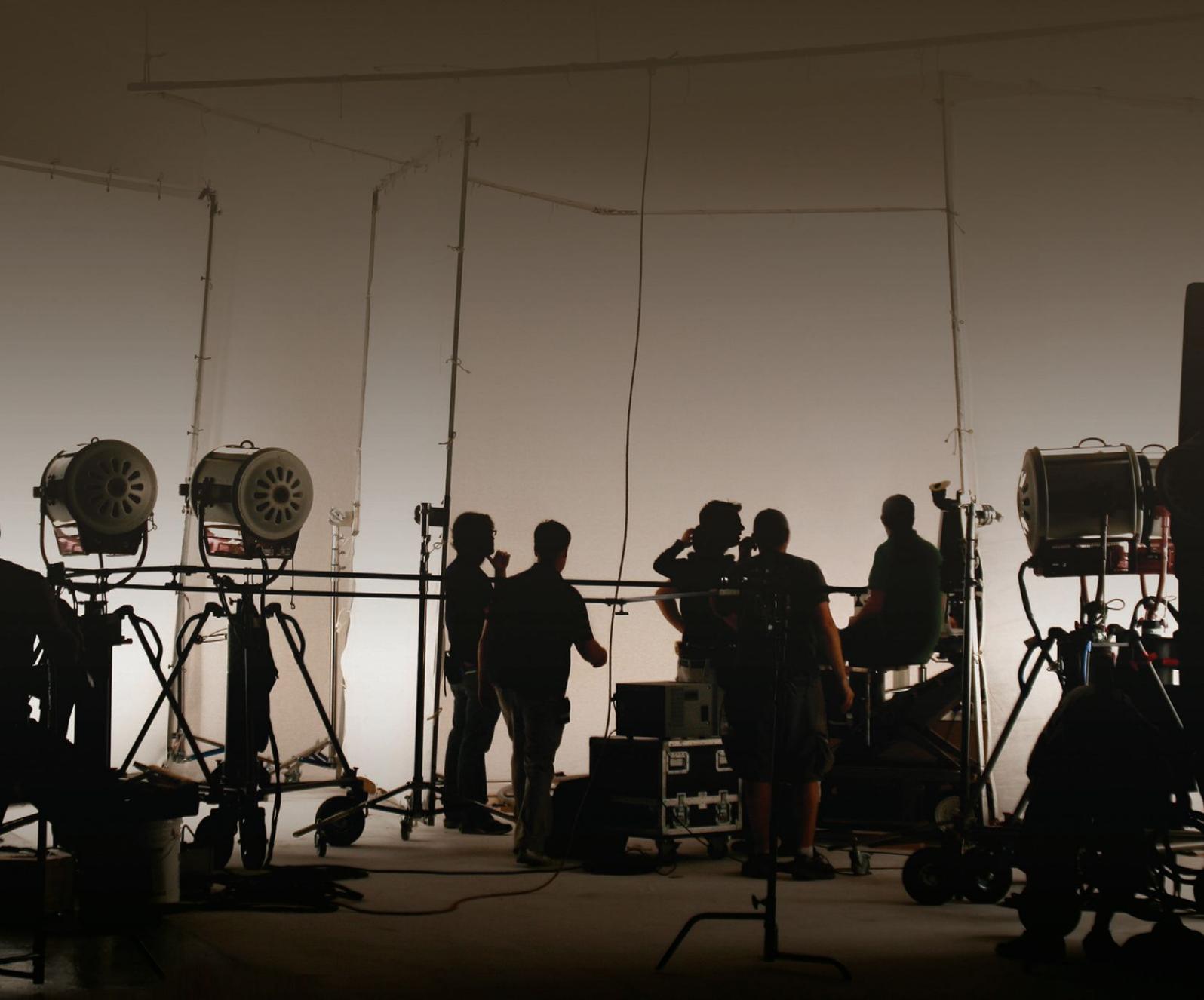
Organizations with leaders who are driving digital transformations have better overall strategies, less data isolation and duplication of effort. Organizational leadership doesn't necessarily come from deep technical mastery. Instead, media company leaders who maintain an understanding of their market potential should be able to articulate the value of technical changes to their organizations. Execs must be able to show how changes are strategically positioning (and re-positioning) the company for on-going success. A valuable element of that kind of communication is to encourage open discussion of failures, not just laud success.

When multiple changes are happening across a company at an ever-increasing rate, making process time to re-connect with the KPI—or objectives of change—is critical. Failure is helpful and instructive when acknowledged and addressed early and often, and that only happens if there is cultural space for failure, and time taken to revisit the driving purpose of a change.

Integrating new technologies is NOT a digital strategy in and of its self. A key is to create a company culture where leaders understand the power of digital technologies, which should help all staff focus on company wide digital strategies that improve company-wide innovation and decision making. ■

Christy King shares her years of media management expertise to help companies make fiscally responsible decisions and design malleable workflows to keep up with a rapidly evolving consumption environment. She previously spent nine years as the in-house technology consultant and tech vendor manager for Zuffa, LLC sports entertainment brands, and recently served as COO for a software company serving the production marketplace.

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The Future of Digital Asset Management is Smart Content

By Mark Yurkovic, Director, Smart Content Council, MESA



Making content smarter requires innovative connected tools and the ability to support the people utilizing the technology

What has happened in the DAM industry over the past three years? Not much (or simply not enough). DAM system solutions continue to add great features to their products, mind you, but many of them are still far behind in supporting the new workflows of the multiple distribution platforms that the new media supply chain must accommodate. Why is this?

Many of the traditional DAM systems have simply not kept up with the changing content workflows and processes that content owners and distributors have had to develop in order to supply a proliferation of outlets for delivering their digital content. For many content owners, digital workflows are still in the experimental/developmental stage.

Part of the evolving problem rests with those individuals charged with operating these new systems and with the experiences of their end-users. Content owners and consumers have all changed

how they work with technology, having high expectations for easy, intuitive, user-friendly systems. While it may be difficult to keep up with the demands and compete with other technology companies, DAM system developers have failed to advance to the next level.

Connecting people and processes

Over the past few years, I have worked with organizations in several different industries and consistently the single biggest challenge in working with traditional DAM systems is connecting the technology to the people and processes; this is always the most challenging aspect in developing an operationally effective content ecosystem for storing, managing and delivering digital content. This is not because end users like to be difficult; it is because of tight deadlines, demanding distribution windows and growing expectations by consumers who want their content everywhere they go and with as little hassle as possible.

This is especially true in the M&E space, in which getting movies and music delivered first or fastest is always the paramount goal. To accomplish this mission, the focus for most professionals is getting the job done quickly even if that requires shortcuts and manual processes. Oftentimes their compensation is based on that goal, not on keeping their content in order; usually nobody judges them on the content chaos they leave behind, but this is certainly not a best practice for organizations as they grow their content libraries and digital distribution workflows at ever-accelerating rates.

So what is the solution to this all-too-common predicament? Yes, there are several amazing tools available that help streamline processes and enhance a DAM system. Some of MESA's members are creating extraordinary

tools to bridge this technology-user gap; they are pushing the limits with their solutions in order to create truly innovative technologies that not only enhance DAM systems, but also give content owners what they expect while interacting with digital technology. Unfortunately, automating the process remains the 'Holy Grail' and we're only at the early stages of this development.

Advancing with AI

It's for this reason that so much attention is being paid to the potential of artificial intelligence (AI) and machine learning, which are now advancing to the point where they will become our industry's next choices for managing content more efficiently. In a recent meeting with MESA's Smart Content Advisors it was very apparent that these senior executives at the leading Hollywood studios are eagerly exploring any means of automating their content workflows and the context connected to it. Some of these executives are planning to invest a large portion of their future budgets and a significant amount of their development on AI and machine learning. This is truly an early but promising sign of what is to come.

It is not just the tools and technology on the content owner side that need to be great; the user experience also has to be amazingly easy. Everyone looks to Google as the example of the ideal end-user experience. You have a simple textbox that you type a word or words into, you hit "return" and presto, you have an amazing result of answers. While this is magical to the end user community, technologists know there is an incredible workforce behind the scenes making the magic appear. For Google, there is a huge staff around the globe using metadata and analytics to help users achieve the expected results. Google is the standard by which all DAM and digital distribution systems are now judged. The user interface for collaboration must be intuitive. Clicking more than three times for an end user to accomplish a task may be two clicks too many.

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Digital strategy consultant Mary Yurkovic has more than 15 years' experience in the publishing, entertainment and technology sectors. She has been responsible for providing efficient and effective solutions for major media companies and her deep understanding of technology, content and digital workflows serves as the foundation for implementing successful solutions. She has helped companies extend their brands to the digital space worldwide.

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SPECIAL REPORT

SECURITY SOLUTIONS

Piracy, as noted by multiple contributors here, has long plagued the content industry – from camcorder-toting movie theater attendees to torrent networks. The MPAA estimates that piracy efforts cost the global content industry \$1.6 billion annually, while the economic loss of music piracy is \$12.5 billion in the U.S. alone, according to the RIAA. The wide availability of both music and video content in higher resolution formats is only expected to exacerbate the threat of piracy moving forward. But new technologies employed across the content production lifecycle can help M&E companies keep everything from production data to finished content safe.

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Content ID Leaves Independents on the Outside Looking In

By Ruth Vitale, CreativeFuture P. 32





The EU Effect on Film and TV

The new General Data Protection Regulation will force M&E companies to do a better job of protecting personal data

By Peter Worrall, Co-founder and Director of Research & Marketing, Fortium Technologies

Abstract: The European General Data Protection Regulation (EU GDPR) becomes law in 2018 and requires every organization to demonstrate that effective security measures are in place to protect data. The new regulations are broad, strict and require stringent regulation—they are retrospective (pre-Brexit) and effect not just those in the EU. The entertainment industry must show that if a leak occurs the data is encrypted or face fines of 4 percent of global turn over. This means all content, wherever it resides. Whether video, scripts or other digitally stored assets on internal servers or external device, content must be secure and encrypted.

We all spent much of the summer obsessing about “Brexit,” the British electorate’s vote to leave the EU. The film and TV industry will undoubtedly be affected by this event, in a variety of ways.

No decisions on how the U.K. will exit the EU have yet been taken and we are all still guessing but there is a lot to consider. On the positive side, the U.K. government could pay the money it was paying into the EU film fund directly into U.K.-based film making. The improved exchange rate since Brexit makes it about 13 percent cheaper for international companies to film in the U.K. than before Brexit. The U.K. government could also offer bigger concessions for U.K. film productions because its hands won’t be tied by EU regulation. There could be greater flexibility about release patterns as the ‘Single Digital Market’ initiative was going to mean that films would have to be released in Europe all at once as one territory. With the U.K. outside the EU it could offer more flexibility for U.K. film makers.

On the other hand, the downside of Brexit is uncertainty, which could mean delays on decision making and postponement of projects. The EU’s ‘Creative Europe’ fund has a budget of €1.46 billion to help tens of thousands of professionals and organizations in film, TV, games, publishing, music, heritage and the performing

Developing new workflows, systems, processes and policies across both traditional and digital platforms, as well as managing new organizational infrastructure, is necessary to keep pace with the speed of technological innovation.

and visual arts. It spends €100m on U.K. filmmaking and post-Brexit this will not continue. New legislation will most likely be needed because the tax treaties need to be renegotiated. There could be fewer U.K. films shown in the EU, and vice versa, because member states have quotas to fill for the amount of EU content they show and there will be less appetite if these financial incentives are withdrawn. Passport restrictions on free passage for European film crews and actors working in the U.K. could prevent or limit these skill sets and negatively impact the talent working on film and TV productions. U.K. films crews and actors working in EU countries could end up with a lot of red tape and delay.

General Data Protection Regulation

While on the subject of the EU, a retrospective regulation emanated from the European Parliament called 'GDPR', The 'General Data Protection Regulation'. It affects every organization that processes EU residents' personally identifiable information. The rules surrounding GDPR will come into force in May 2018 and will not only impact companies in the EU, but companies globally that work with the EU. It seems that companies are only now slowly waking up to the potentially enormous task they need to prepare for.

The obvious area of GDPR that affects the film and TV industry is the data held on film crews, actors and everyone else associated with a production. Data on payments to individuals, tax information, distribution lists, emails and any electronic communication is what this is about.

The Sony hack that revealed, and continues to reveal, so much personal data is the obvious example of what the EU is trying to protect against. Networks and servers continue to be breached regularly as we often

read in the headlines.

For those companies employing more than 250 people and processing data on individuals in the EU, the requirements for GDPR are rigorous. A specific data protection officer will need to be appointed and companies will need to report a data breach, concerning individuals whose data was lost, within 72 hours. Under the current directive there is no such obligation to inform an authority that a breach has occurred. Companies will need to track where personal data was used in the supply chain and if a data breach does occur, then the data leaked should have been scrambled and unintelligible to the receiving party and this will be checked by the regulators investigating the breach.

Organizations will need to do regular internal information audits. If personal data is put at risk, for example information relating to actors' pay and contracts, then the organization will become liable and will have a duty to undertake further audits and correct the security procedures.

The interactive nature of the TV and film industry with the use of social media to promote and connect with fans means the effect of GDPR could be far reaching and expensive. The enforcement of GDPR will be Draconian. Fines will be imposed on those not complying, which could cost up to the greater of 4 percent of annual global turnover or €20m euros.

Implications for widespread data security

Could GDPR be a white elephant? Those of the grey pony tail brigade will remember the

hiatus that occurred with Y2K, concerning fears of computer clocks not being able to adjust to the year 2000, which risked terabytes of lost data. Many expensive measures were put in place, such as the passing of the 'Year 2000 Information and Readiness Disclosure Act' in 1998, by order of the U.S. President, and the total cost of preventative work to adjust for Y2K ran into the billions.

Data security is something that film and TV CIOs grapple with on a daily basis. The strength of network security is where most of the attention is focused but encrypting data at rest in addition has to be an obvious preventative measure. If data residing on a server is encrypted, then an unlawfully accessed corporate server or iCloud account will not expose the sensitive data stored there.

Encryption at rest also means that accidental data loss from the wrong email address, a lost laptop or USB drive simply doesn't matter as data cannot be accessed, exploited or released online. Tracking a data loss is important but ensuring controlled access in the first place is a more pro-active measure.

While the GDPR regulation will force companies to do a better job of protecting personal data, perhaps the same philosophy should relate to all sensitive data. At Fortium we are focused on protecting premium TV and movie content in the most sensitive stages of the workflow, such as post production, editing and localization.

It can be difficult persuading companies to spend money on security and it often takes an actual content leak for management to then act. Prevention is better than cure but also less expensive in the long run. ■

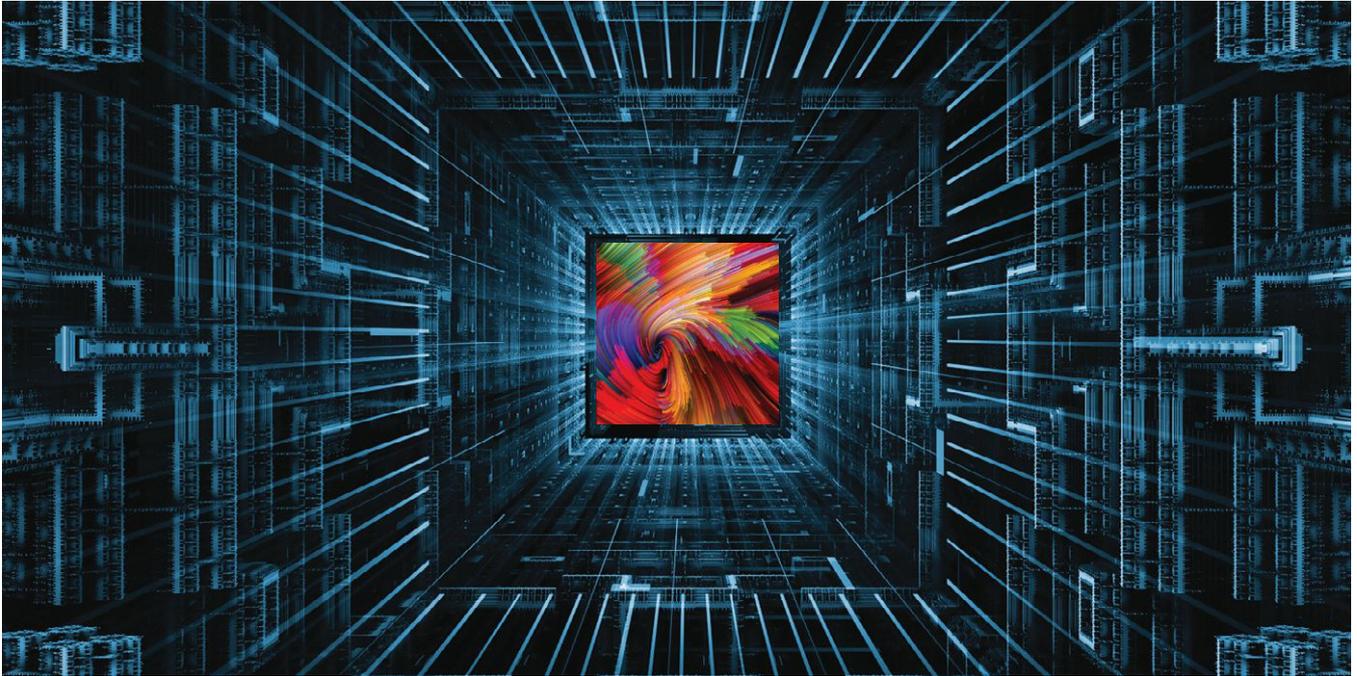


In a fast changing digital world, Peter Worrall has successfully identified and opened up new markets into which Fortium is successfully providing unique encryption technology solutions. He formerly worked in journalism and research.

Will HDR Video Be the Reason Security Finally Increases?

Studios are planning to offer HDR as a mass-market proposition by 2018

By Harrie Tholen, Managing Director, NexGuard



Abstract: The advent of better resolution content like High Dynamic Range (HDR) is yet another attractive proposition for pirates around the globe. The content industry, however, can effectively protect its high value assets through the implementation of technical and legal additions to the current protection arsenal in place.

Piracy has long plagued the content industry – from camcorder-toting movie theatre attendees to re-streaming and torrent networks. The Motion Picture Association of America evaluates that piracy efforts cost the global content industry a whopping \$6.1 billion annually.

From a technological point of view, tackling content piracy works best by combining three fundamental solutions that safeguard against illicit actions pre- and post-access. The first step involves the deployment of Conditional Access (CA) and Digital Rights Management (DRM) – two integrated encryption technologies that control unauthorized access to programming before the intended users access the intended piece of content. In the CA model, the rights owner licenses networks to distribute content and take on the responsibility of determining the legitimacy of users who want content access – through subscriber management systems, subscriber authorization systems and security modules. DRM, on the other hand, is a software-based protection model that works best for OTT content delivered to multiscreen devices for consumers who want to access content immediately, but also possibly watch it later.

Although CA and DRM provide a very strong rampart against piracy, windows for illicit seizing still remain – video sharing up to HD and live re-streaming over P2P networks are two examples. The Digital Millennium Copyright Act (DMCA) was enacted as a direct result of industry demand to implement copyright law to combat piracy, addressing the rights of copyrighted material owners and internet service providers. By issuing takedown notices, the content industry can legally mandate the removal of infringed content from unauthorized sources. The addition of a network-level watermark will help to automatically confirm the rights ownership per distribution path.

Forensic watermarking acts as the last stone in this effective three-sided technological fort against pirates. Developed to protect intellectual property, the solution involves the insertion of a unique, invisible identifying code into a media asset to serve as a contractual compliance between content owners and intended subscribers – regardless of how it might be transcoded, resized, downscaled or otherwise altered for distribution. Watermarking detection identifies the source of unauthorized OTT, VOD and live TV re-streaming by rogue subscribers. Both processes work across the entire quality spectrum from standard

resolution live streaming apps to 4K/Ultra High Definition (UHD) and HDR.

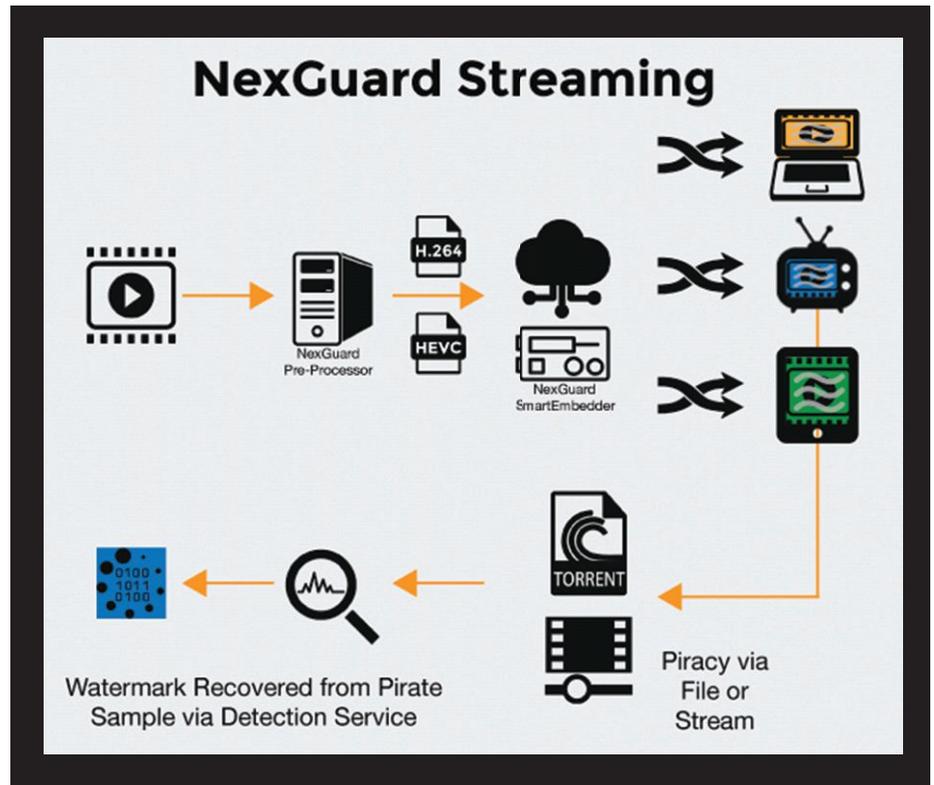
Where does HDR differ?

HDR content presents as more lifelike than any other resolution and can be differentiated from all other forms of content in two key areas: contrast and color enhancements. This is achieved by expanding the quantity of nits (a unit of brightness) in bright content while decreasing it to the lowest degree in the darkest content. HDR additionally offers 1024 colors instead of the traditional 256 RGB (Red, Green, Blue) values. This way, the gradations between shades and different tones in onscreen content present a far greater degree of realism to the viewer – referred to as the “wide color gamut” by 4K TV makers.

The result is a richer range of colors, more realistic whites and much deeper darks that can all be displayed simultaneously on any 4K-capable screen. This improvement in contrast and color enhancement, however, can prove challenging for watermarking providers. A watermark needs to remain completely invisible to the human eye to be effective, requiring careful testing by Golden Eyes – sight experts who watch all watermarked content to identify any superimpositions. With the increased detail specifications of HDR, we needed to adapt our existing solutions – deployed by all major studios and multiple pay-TV operators around the world – to ensure that the watermarking technology would remain completely invisible throughout the entire pieces of content.

Is HDR really a revolution for content protection?

Since the early deployments of 4K quality content, the content industry has started to put new systems in place to better secure its revenue. A step in the right direction was taken in 2013 with the publication of the first version of the MovieLabs Specification for Enhanced Content Protection, a set of security recommendations produced by the joint venture of six major motion picture studios that invest in accelerating the development of technologies essential to the distribution and use of consumer media. As a result, studios now mandate these specifications for all pay-TV service providers and other licens-



With the increased detail specifications of HDR, we needed to adapt our existing solutions to ensure that the watermarking technology will remain completely invisible throughout entire pieces of content.

ees that want access to enhanced content.

Strategy Analytics forecasts that annual worldwide sales of HDR-enabled TVs will reach 58 million units in 2020 with penetration of HDR TVs in the United States projected to reach nearly 25 percent of homes. This requirement to protect HDR content is increasingly crucial as more consumers obtain access to this higher quality and higher valued content – including early release movies or premium productions shot in HDR. This content will be developed for distribution to home TVs before becoming available for HDR-capable tablets in future. However, content to home TVs is usually distributed via a set-top box, where access to content is traditionally protected by a card and root of trust. If either of these sources were to be hacked, a practice possible for experienced pirates, premium content would become immediately redistributed on illegitimate stream-

ing websites or downloaded via torrents.

This is where forensic watermarking becomes a fundamental tool: the presence of a unique identifier for each piece of content makes retrieval a lot easier and enables content owners to easily identify the weak link in their distribution systems. The ability to trace illicit redistribution to the original source makes it a very strong piracy deterrent, as content owners can strongly warn pirates, and even consumers watching an illegal stream, against the legal implications of accessing or sharing copyrighted content.

Studios are planning to offer HDR as a mass market proposition by 2018, so content owners need to implement or upgrade their protection arsenal now. By preparing for the next pixel revolution, they can avoid the pitfalls of tech-savvy pirates and better educate consumers on the latest specifications for content protection. ■

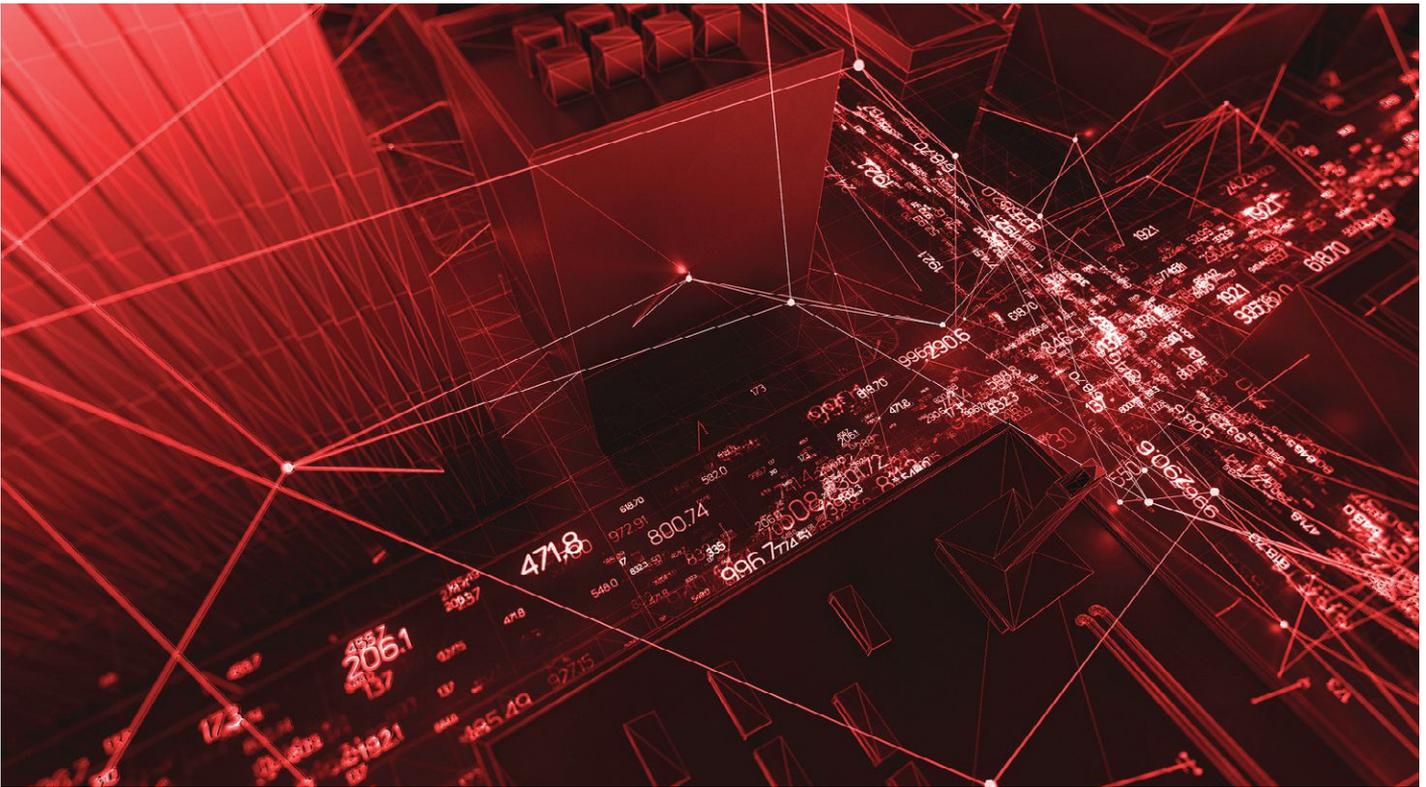


Harrie Tholen leads NexGuard, a Kudelski company providing the most widely deployed forensic watermarking solutions in the global movie and entertainment industry. A Dutch national with experience in the Asia Pacific and American markets, Tholen is a global expert on content protection and tackling the illegal redistribution of content. He has over 15 years of experience in the digital broadcasting and mobile multimedia industries.

Forensic Watermarking: Implementation Challenges and Opportunities

There is no “one-size-fits-all” watermarking solution that meets the needs of distributors and content providers for both VOD and live content

**By Rajan Samtani, Senior Advisor, and Graham Oakes, CEO,
Media Science International**



Abstract: As content creators and distributors produce increasingly compelling and valuable content for consumers at ever higher fidelity, MovieLabs came up with a new mechanism for Enhanced Content Protection (“ECP”) to ensure the viability of these technical and creative advances. However, there is no “one size fits all” watermarking solution that meets both the needs of the distributors and content providers. This article provides an overview and recommendations of how the ecosystem can come together to overcome the challenges that can lead to measurable piracy mitigation outcomes for all stakeholders with forensic watermarking.

Digital content capture and distribution technologies have evolved at a rapid pace as evidenced by the recent push by CE manufacturers, OTT distributors and content owners to move from HD to 4K/UHD and HDR. Content creators and distributors use these new technologies to produce and distribute increasingly compelling and valuable content for consumers at much higher resolution and fidelity, i.e. more, as well as better, pixels.

Amid these improvements in the quality of the viewing experience, the business models in both movie and TV distribution are also under pressure to shrink the available “windows” of distribution as we make the transition from closed, managed service models for licensed content to open, over-the-top models, as well as internet and mobile distribution.

Unfortunately, digital content distributed at very high fidelity within shrinking windows and viewed on highly capable display devices creates an ideal environment for content pirates, who can quickly create very high quality copies using simple techniques that take advantage of the analog hole (i.e. using a camcorder to record content off a display device, or readily available digital-to-analog signal multiplexing techniques), thus

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Based on video piracy statistics for SD and HD content available from multiple sources, it is clear that the threat of piracy from BitTorrent, on-demand cyberlockers, streaming sites and dedicated IPTV-oriented pirate services remains rampant and will only increase when content is widely available in UHD.

greatly increasing the risk of unlawful reproduction and redistribution. Based on video piracy statistics for SD and HD content available from multiple sources, it is clear that the threat of piracy from BitTorrent, on-demand cyberlockers, streaming sites and dedicated IPTV-oriented pirate services remains rampant and will only increase when content is widely available in UHD.

In anticipation of this threatening “perfect storm,” MovieLabs in April of 2014 published a new set of Enhanced Content Protection (ECP) guidelines—defining requirements and best practices to ensure the viability of these technical and creative advances through the addition of more stringent policies related to content protection methods required by licensees and distributors. These included hardened security in hardware and trusted software along with the use of forensic watermarking.

One of the major requirements in the MovieLabs ECP guidelines pertains to the use of “session-based” forensic watermarking to identify individual user information, and identify compromised devices that can be revoked and renewed, as required. The idea behind this requirement is that forensic watermarking technology is the only proven method robust enough to survive digital-to-analog transformations in order to trace the origin of an illegally redistributed stream or file back to the individual device from which it was captured.

However, the ECP guidelines do not go into any details about the specific requirements for the proper implementation of a forensic watermarking system. Industry players are working on defining and testing these requirements.

In addition to the requirements for the particular watermarking technology to be robust and imperceptible and to support UHD features for higher resolution, pixel depth, dynamic range and wider color gamut, build-

ing out the operational ecosystem and related policies for forensic watermarking that can lead to measurable piracy mitigation outcomes is a major challenge for all stakeholders. Several factors contribute to the challenge.

Complex ecosystem

In any watermarking implementation, several different companies in the value chain must interact and cooperate. There are entities that directly benefit from embedding, tracking and tracing the forensic information and that mandate its use in the ecosystem; others that have to implement the embedding and detection technology, and yet others that provide required anti-piracy remediation services.

Below is a synopsis of the required roles for various types of watermarking applications. Depending on the application, in some cases a single entity can play more than one role. Here are the roles and a simple definition attached to each role.

Mandator: This is the entity, usually the content owner, which issues the requirement to use watermarking and provides the “approvals” for required levels of robustness and perceptibility for a given technology.

Service provider: This is usually the distribution company that is contractually required to implement the watermarking

system through integration with its suppliers of core watermark technology, middleware and infrastructure. In the case of pay-TV, this would be the MVPD.

Implementer: This is usually the entity that actually provides the watermark embedding technology or service. Often it is a middleware provider such as a conditional access system or digital rights management provider.

Dependent middleware: This is usually the entity that needs to interact with the watermarking technology during the embedding process, for example, an encoding or transcoding vendor.

Device manufacturer: An end-point device that must either react to an embedded watermark or at least “do no harm” to the watermark; for example, a set-top manufacturer or a SoC supplier.

Content delivery network: Usually a company that provides the delivery infrastructure.

Monitoring service provider: This is the entity that supplies the crawling/monitoring function, and in some cases, the actual detector functionality to find the forensically watermarked files outside the authorized distribution domain.

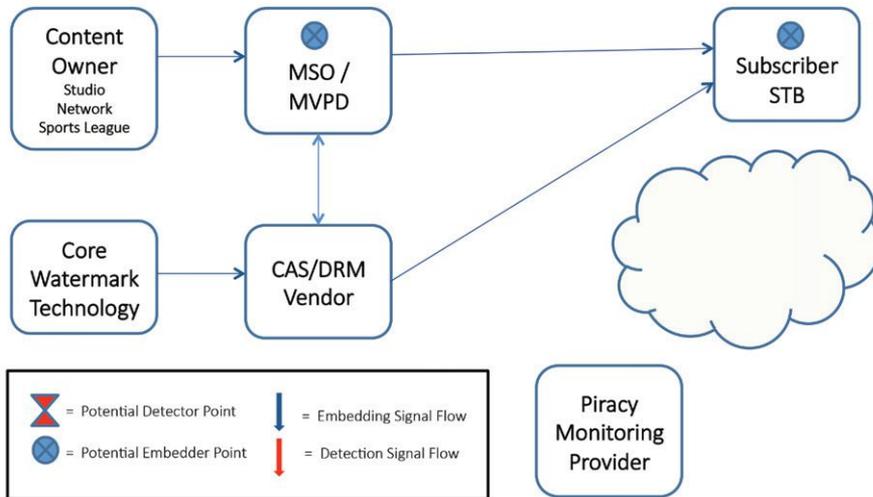


Rajan “Raj” Samtani is a seasoned media industry consultant focused on content protection and content ID technologies. In addition to advising Media Science International, he is a senior advisor to the Digital Watermarking Alliance. Samtani has more than 16 years of strategic business development, IP licensing and technology marketing experience.

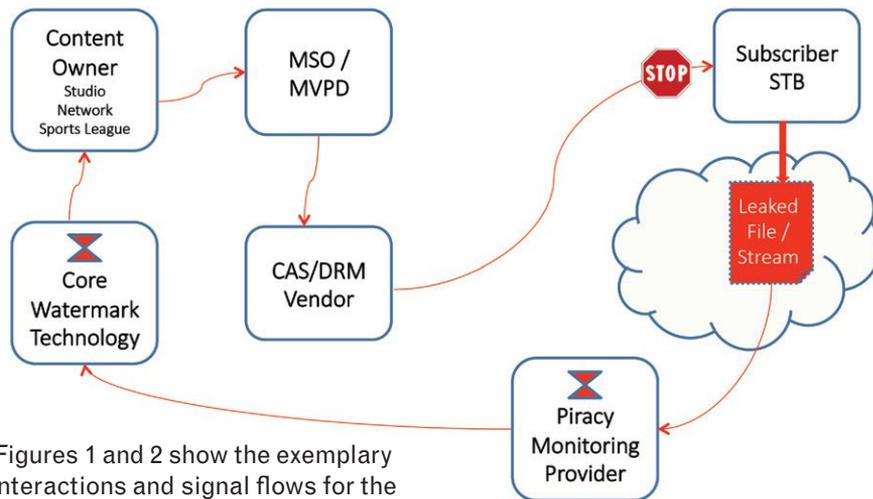


Graham Oakes leads strategy, operations and business development at MSI and also serves as Chairman of the Board of the Digital Watermarking Alliance. Under his leadership, MSI has become a leading supplier of watermarking, copy protection and anti-piracy services and was named the exclusive watermark registration agent for the Recording Industry Association of America.

1) Pay TV Forensic Watermark Ecosystem (Embedding)



2) Pay TV Forensic Watermark Ecosystem (Detection)



Figures 1 and 2 show the exemplary interactions and signal flows for the pay-TV ecosystem.

In order for these systems to work, the following sets of collaborative principles need to be agreed and orchestrated within the ecosystem:

■ With content available from a multitude of legal distribution sources, effective use of watermarking requires support and collaboration from many parts of the ecosystem, from chipsets to STB to MVPD to networks and core technology suppliers as well as monitoring providers. Therefore, content owner requirements for robustness and imperceptibility need to be conform to real world requirements.

■ Due to the global nature of content piracy, piracy monitoring systems need to become more efficient and collaborative in order to create effective and sustainable enforcement strategies, instead of just relying on current DMCA whack-a-mole tactics.

■ There are no standards in place for true session-based forensic tracking systems (aside from those used in digital cinema) and therefore enforcement efforts are impeded by the fact that pirated content can originate from multiple sources distributed by different operators, which may use multiple watermarking providers and keys. As a result, monitoring providers do not know which watermark may be in the pirated copy and therefore which detector to use, thereby making tracking across multiple operator environments hard to scale. There are some efforts underway to solve the business and technical challenges to with business processes and best practices, which can streamline the use of detection technologies at scale.

■ Many jurisdictions have completely different privacy regimes which may hamper the development of harmonized policies to deter or delay the deployment of forensic watermarking on a global scale. Content owners need to deploy resources to educate and convince policy makers in different jurisdictions of the harm caused by inconsistency in piracy enforcement methods.

Misaligned incentives

In addition, watermarking imposes a relatively high cost burden on content distributors and multiplatform operators. The incentives to implement watermarking and pay for watermarking are misaligned between the parties that receive the direct benefits

Core technology supplier: This is the entity that supplies the core technology/ algorithms and basic functionality to implement the watermark embedder and detector.

The best way to think of these ecosystem interactions is to recognize that the “pressure” to implement watermarking originates with the mandator and subsequent business and technical responsibilities flow down to the other entities. The relationships and the obligations among the various parties are generally governed by the strictures of complex licensing agreements – and in some

cases, augmented by industry groups that can guide some harmonization of best practices – which enumerate the requirements and responsibilities of the other players in the ecosystem.

Inconsistent policies

There is no “one-size-fits-all” watermarking solution that meets the needs of distributors and content providers for both VOD and live content (in broadcast as well as OTT distribution), because of where and how the embedding workflows need to be performed, such as server side/head-end, client-side/STB or player device, in the CDN etc.

Continued on page 110

Workspace Virtualization: An Emerging Solution for Securing Digital Media Assets and IP

Innovative studios lock down the security of their media assets without sacrificing the flexibility or vision of creative teams

By Jill Milton, Director of Business Development, Teradici



Abstract: Intellectual property is the life's blood of the entertainment industry. Even a single leaked frame of a modern blockbuster can spoil the box office, resulting in millions of dollars of lost revenue in distribution sales and licensing. With data breaches on the rise – including organized hacking attempts by state-sponsored entities – M&E companies need new tools to protect their petabytes of data, particularly as media production grows increasingly geographically dispersed. Workspace virtualization based on the PCoIP protocol is one such tool that's already helping innovative studios lock down the security of their media assets without sacrificing the flexibility or vision of their creative teams.

Hollywood filmmakers love hackers. From crime thrillers to superhero sagas, cyber crooks have become the go-to bad guys of countless modern movies and TV shows. Even some silver screen heroes have used cyber attacks to take down 21st Century villains and save the day.

But that's all fiction. What Hollywood studios don't love is when they themselves become the targets of real world cyber threats.

A glance at the headlines is all it takes to see how grave the

danger has become. From spyware to ransomware, from phishing attacks to complex, internet-based exploits, the list of tools used by criminals to gain access to sensitive information systems seems to grow almost daily. Worse, these attacks are being launched not just by individuals, but also as tools of organized crime and even state-sponsored espionage.

The risks for M&E companies cannot be overstated. In an industry in which even a single leaked frame of a major Hollywood blockbuster can spoil the box office, resulting in countless losses in distribution sales and licensing, for cyber criminals to



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gain access to media assets while still in production would be disastrous.

As media production evolves into an all-digital enterprise, the need for M&E companies to protect digital assets and intellectual property from online attacks is critical. What M&E companies need, now more than ever, are new tools to help secure the intellectual property that's the digital life's blood of their businesses.

Going virtual

One such tool that has emerged is workspace virtualization, and it's already being used by a number of studios and production houses, both to improve their workflows and to address their unique information security challenge.

At first glance, a virtualized workspace looks very much like an ordinary desktop PC. The difference is that in a virtualized environment, the software applications are not actually running on the hardware that's sitting on the desk. Instead, they're running on a remote workstation – typically one that's much more powerful – that's housed in a data center elsewhere. What the user sees on the screen is but an image of that remote computer's desktop, transmitted over the network. In that sense, today's virtual workspaces are very similar to the “dumb terminals” of yesterday – only instead of glowing green text, they display full-fidelity, rich GUI environments.

Early iterations of this technology were somewhat limited. They were suitable for office applications but lacked the image quality and responsiveness required for graphically intensive workloads such as high-resolution video editing or 3D graphics. With the arrival of the PCoIP protocol, however – an advanced workspace virtualization technology developed by British Columbia, Canada-based Teradici – it became possible to virtualize even the most demanding visualization applications with seamless fidelity and responsiveness.

Today, PCoIP powers a range of workspace virtualization solutions from such vendors as Amazon Web Services (AWS) and VMware, among others. More recently, specialized PCoIP-based solutions have emerged that specifically target the M&E industry, such as Los Angeles-based BeBop.

Often, customers are attracted to these solutions because they can help ease some of the systems management and workflow challenges that

inevitably arise with a geographically dispersed workforce. As it turns out, however, the same features that make virtualized environments easier to manage also make them more secure.

Locking down the endpoint

First, just the nature of a virtual workspace increases security on the user's desktop. An endpoint device might be an ordinary PC running a simple software client on a Windows or OS X, but more often it will be a so-called thin client with a stripped down, minimalized OS – or better yet, a Zero Client, which has no local OS, memory, or storage at all. These ultra-simplified systems have far fewer “moving parts” than traditional PCs and thin clients, meaning they have far fewer vulnerabilities for attackers to exploit. A Zero Client, for example, is utterly impervious to viruses and spyware – it literally lacks the “brains” necessary to run the malware code.

Furthermore, in a virtualized environment no data ever leaves the data center. Nothing is stored on the client endpoint; in fact, no files or media assets are ever transferred over the network at all. Even if thieves were to break into the office and physically steal the client hardware, they could extract no data from the devices, because there simply would be nothing there.

This is possible because PCoIP is not a data transfer protocol in the traditional sense. Instead of transferring files or blocks, it merely transmits the image of the remote workstation's desktop to the client endpoint as a stream of pixel data, which the client reassembles to reproduce the image on its screen. Even if attackers were somehow able to intercept this stream, they

would not gain access to any files or assets. All they would be able to do is view whatever was onscreen at that given moment. And because PCoIP encrypts its pixel stream using cryptography that meets the highest standards of the U.S. government, the chance of any such eavesdropping is vanishingly small.

Keeping data where it belongs

For M&E companies, workspace virtualization has the additional benefit of solving the data transportation problem. Particularly for productions shot in 4K UHD, transferring even a single scene over the network can be time consuming and costly. The problem is compounded when the job involves artists working in geographically dispersed locations, perhaps spanning multiple time zones. Worse, all of this shuffling around of assets and intellectual property introduces even further security concerns. How can the studio be sure that the network and data center at each location – and all of the connections in between – are equally secure? The more complex the environment, the greater the risk that there's a “weakest link” lurking somewhere in the security chain.

Workspace virtualization addresses these concerns by allowing all of a given project's assets and data to remain in one place. Because applications are only ever accessed over a secure PCoIP link, IT can consolidate all of the back-end systems that support those applications into a single data center – including not just file servers, but also render farms and storage arrays

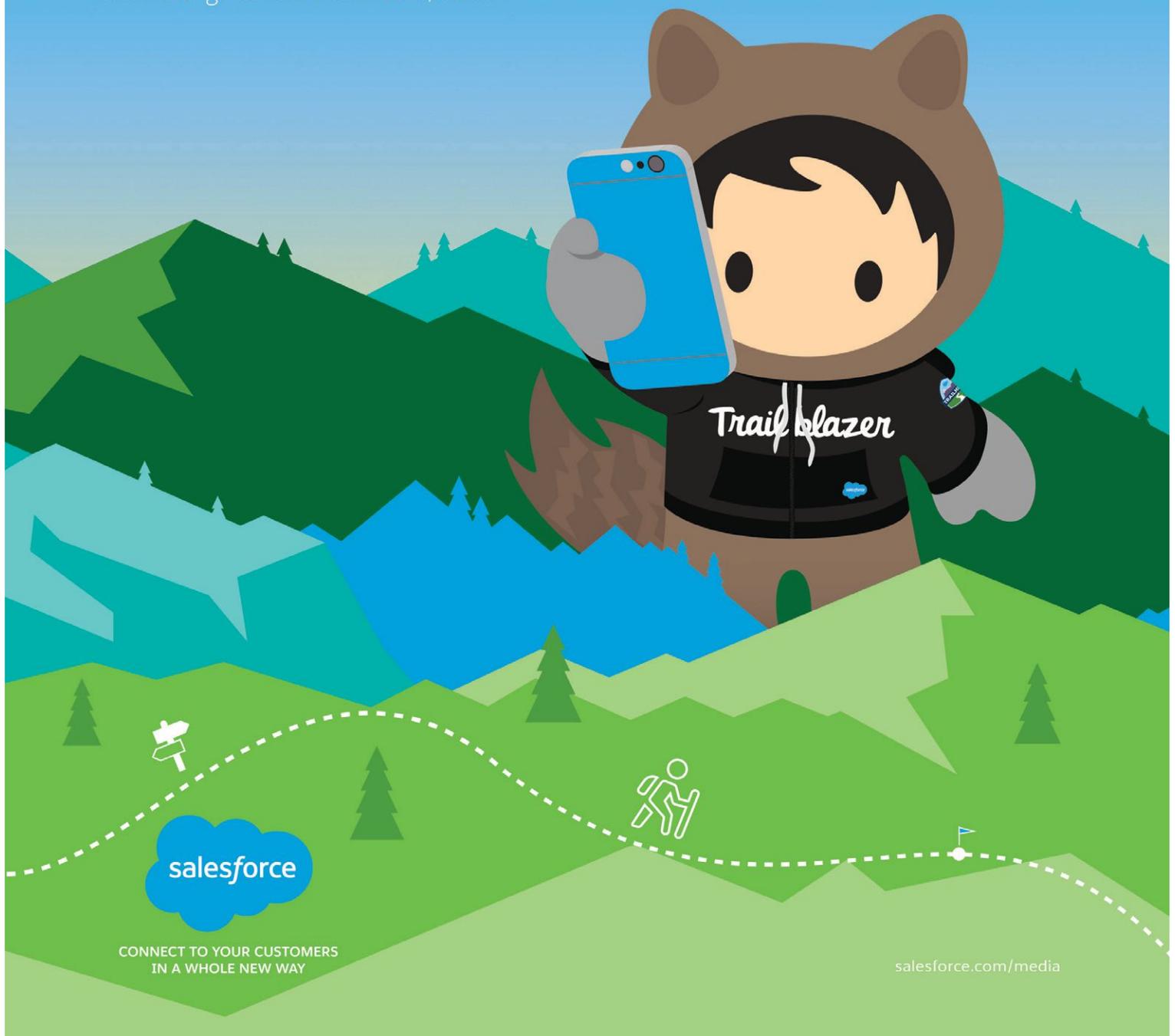
Continued on page 112



Jill Milton has been with Teradici for five years, helping to develop new offers in M&E for on premise datacenters and public and private clouds, working with key customers in feature animation, VFX and post production. Prior to Teradici, Jill worked at C-Cube Microsystems, where she was responsible for supporting large media customers and their suppliers in the conversion to digital video.

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Keeping Production Data Safe

By Jeff Impey, Co-Founder, SyncOnSet Technologies



Why it's important to upgrade the analog solutions often used to manage content on set

Abstract: There's a lot of talk about cyber threats and data security, but an area often overlooked is the risk associated with the use of paper documents and personal applications on set. Film production is a fast-paced environment with large freelance crews with diverse technology needs. While the conversation often revolves around the apps crews use, it's equally important to look at the impact analog solutions (3-ring binders) have on efforts to keep content safe. Keeping data safe and reducing business risks is an important combination of data security, content protection and data retention.

The complex, fast-paced workflow and sensitive nature of film production present unique security challenges never faced by many traditional organizations. Film production requires hiring hundreds of freelance crew (which may or may not have a history of working together) and an entire ecosystem of vendors incredibly quickly. As the backbone, scripts need to be efficiently distributed to crew members to allow them to begin their creative process and orchestrate all logistics. Notes, photos, and video are constantly shared in this highly collaborative production environment. To do this effectively, crews use a myriad of disparate (approved and unapproved) solutions: personal cameras and smartphones, file storage apps, email, digital-dailies systems, spreadsheets, shared documents, homegrown database programs, production software, consumer/social apps--and the list goes on. Without these tools, managing the complexity would be impossible. But it can be challenging to efficiently assess the risks and benefits these many different tools pose to the production and studio.

SyncOnSet, as the industry-standard continuity and inventory software for production design departments, has undergone separate security assessments by all major film studios. Since SyncOnSet is the first cloud-based software for the specific workflow it solves,

with the only alternative being a three-ring binder, studios have had to assess the benefits of "cloud vs. on-premise," "digital vs. analog," and evaluate the alternatives for an unfamiliar workflow. While most SyncOnSet end-users are crew (costume supervisors, make-up artists, set decorators and the like), we view our relationship with studios as a partnership to bring the best of both worlds: efficient and secure solutions. Together we continue to develop new content protection and data security procedures that make production data significantly safer than previous alternatives.

Stereotypically, we think of cyber security as protection against criminal hackers hoping to make huge profits from your data. But keeping data safe and reducing business risks is an important combination of (1) data security (protection from external attacks), (2) content protection (governance and control over privileged access), and (3) data retention (redundant data, data re-entry, and business risks without backups). All three are essential to the overall safety of your data. For instance, keeping data 100 percent safe from external hackers may not eliminate business risks if the only copy of the data was stored on a failed hard-drive. So we'll look at all three elements of keeping data safe, highlighting real examples of each within the context of physical production.

Data security (The devil you know...)

Crew come from a wide range of previous projects with different relationships, tools, and procedures. At the start of production, it's important to have clear protocol and a point of contact responsible for security approval that all crew are made aware of. Too often, we've seen confusion by crew on who to ask for approval and confusion between a budget approval and a security approval. We've even experienced crew members fearful of asking for approval—a dangerous behavior that can lead to a lack of transparency from the start. Better the devil you know than the devil you don't.

Productions are bound to discover new tools that have yet to be evaluated. When evaluating, the first step is understanding the business purpose of the application. Studios may become aware of a software tool after it is already in use by crew, or the review process

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may not be fully completed by the time a production expects to start using the application.

So if the tool were to fail the evaluation, what are the implications of immediately preventing its use? Is the crew left with no option but to continue to use the application? Is the crew left with even worse options, security-wise? Or, if there are good alternatives, how do you transition the crew onto the preferred tool? To answer these important questions, it is essential to fully understand why, when, and by whom the application is used.

Once the business purpose is identified, clear compliance requirements can streamline the review process and give software vendors guidelines on how to remediate any issues quickly. Initial reviews are often conducted in high-pressure situations, with crew usage put on hold until completion. The most successful implementations begin as a partnership between the studio and vendor and include a designated point person to coordinate between the vendor, the crew, relevant business units, and the security teams tasked with evaluating the software. This point person can take a holistic view while evaluating the software to understand its likelihood to increase or decrease business risks. By having a complete view, they can also determine whether larger partnerships and integrations can be helpful to effectively manage user access control and prevent data duplication to disparate systems.

Content protection (Advanced three-ring binder?)

There is a cognitive dissonance when it comes to thinking about keeping content stored in physical form safe, versus keeping digital records safe. Little thought is given to the content protection of a production binder (three-ring binders that crew use to store photos and production notes). Crew-written notes in a notebook don't usually fall under the purview of a studio technology group.

While a three-ring binder may not be accessed by an external hacker in a different country, there are huge limitations to physical pen and paper in terms of content protection. You can't set a three-ring binder to be read-only, you can't see a log of every person who has seen that three-ring binder, and you can't set permissions on which individuals can see certain pages. An advanced three-ring binder

content protection system would be a sticky note that says "KEEP OUT."

Let's take a look at several examples that highlight the true risks and limitations of content stored in physical form. On shoot days involving extra cast and background characters, additional "day players" will be hired for the day. In the costume department, "day players" are required to take hundreds of continuity photos and notes. Without a digital solution, these notes will be written in binders and the photos often taken on personal mobile devices. Not only can this become a logistical nightmare to compile all the notes and photos, but at the end of the day there is no way to revoke access. Production is left with little control over those photos. How do you know if they're shared with unauthorized outsiders?

We've also witnessed more alarming procedures by crew members who do not have a digital alternative. For projects that have not adopted SyncOnSet, it has been surprisingly common practice for crew members to print sensitive costume fitting photos or continuity photos at a local print shop. For major tentpole feature films (\$100M+ budget), this is a significant gap in content protection.

In another extreme example, a crew member was fired in the middle of production. This person, upset with losing their job, stole the entire production binder, leaving the remaining crew with no roadmap for continuity or record of work already complete. With a digital, cloud-based system, a crew member can't simply walk off with the only copy of critical production data.

As new technologies are implemented to digitize what was once on paper, novel security innovations are leading to greater protection of studio content. For one major studio's highest budget tentpole film ever, there were concerns over crew and day-player access to pre-release costume and set photos. SyncOnSet and the studio partnered to develop watermarking on all continuity and set photos taken by crew members, a new

level of content protection that could never be possible in a three-ring binder.

Data retention (The dog ate my homework!)

The importance of data redundancy is unfortunately often overlooked until a tragic loss is experienced first-hand. On several occasions, productions have adopted SyncOnSet only after such catastrophic occasions. One particularly significant loss involved the crash of a Filemaker-based program used to track purchases within the costume department. This desktop-based software was responsible for managing over \$3 million in purchases for the costume department. When it crashed, it set the team back days and much of the information simply could never be recovered or recreated. With so much at stake, productions should not allow the dog to eat their homework.

The benefit of cloud solutions is the ability to protect against hardware failure by utilizing multiple physically separate data centers in parallel. For example, using a provider like Amazon Web Services, data can easily be backed up to multiple secure data centers in each region as well as distributed across geographically separate regions. In addition, large enterprise cloud providers offer high availability, redundancy, business continuity, disaster recovery, and incident management far greater than single industry-specific providers.

The Holy Grail: Perfect security

While perfect security will never be fully realized, significant improvements can (and are) being made with the collaboration of studios, software vendors, and production teams. At the end of the day, everyone has the same goal of making a successful film and mitigating risks along the way. So when evaluating systems and determining how to keep data safe, it's important to take a holistic approach. ■



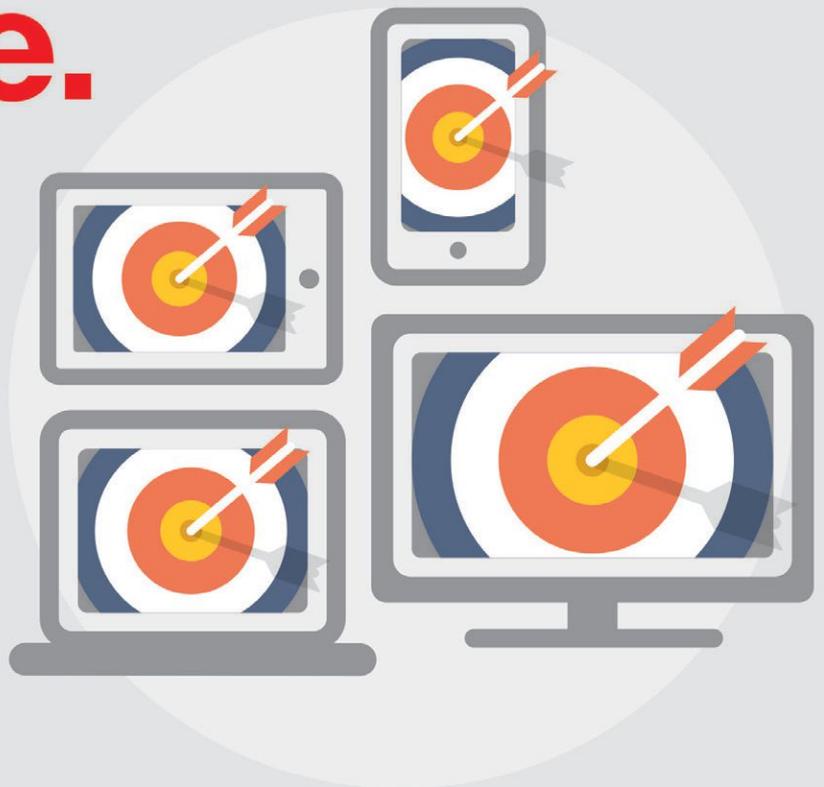
In 2012, Jeff Impey co-founded SyncOnSet Technologies and has worked in all aspects of the business growing it from an initial inspiration into an industry standard for tracking continuity and inventory on film sets. SyncOnSet is now embraced by thousands of TV series and films around the world. Prior to starting SyncOnSet, Jeff worked in technology investment banking.

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Content ID Leaves Independents on the Outside Looking In

Filmmakers and musicians that do not qualify to use YouTube's Content ID are forced to spend hours policing the platform to protect their work

Abstract: While ushering in an unparalleled era of video sharing online, YouTube has unintentionally created a virtual playground for pirates. And the onus is on YouTube to do something about it. If Content ID were made available to all of its users, without exception, perhaps YouTube could unearth a new data-driven, crowdsourced solution to the problem of piracy on its own platforms that could serve as a model for other services. ►

By Ruth Vitale, CEO, CreativeFuture

Content ID is a step in the right direction, but with a full decade to improve upon a clearly flawed and overly complex system, Content ID still has the unique distinction of frustrating both copyright holders and YouTube creators.

If you were online in May of 2015, you were probably aware that YouTube was having a party because literally everyone was invited. A YouTube-produced highlight video celebrating its tenth anniversary was shared everywhere – peaking at around 17 million views – while Google’s public relations department worked overtime to make sure every tech magazine, news outlet, and website heralded the milestone with elaborate retrospectives to celebrate the digital video platform’s first decade online.

Next year marks the tenth anniversary of YouTube’s Content ID system. But don’t expect the Google-owned digital video service to celebrate that dubious birthday with the same fanfare.

Why?

There won’t be a party for Content ID because despite its promise, the copyright claim system leaves much to be desired. Yes, Content ID is a step in the right direction, but with a full decade to improve upon a clearly flawed and overly complex system, Content ID still has the unique distinction of frustrating both copyright holders and YouTube creators.

YouTube has, without question, expanded access to creative works and provided artists of all kinds to try out new ideas and deliver fully formed works directly to their fans whenever they choose. Digital video platforms – YouTube, Livestream, Vimeo, Facebook Live, and others – have moved aside the gatekeepers, allowing anyone with an idea to express it, share it, and see, in real-time, how the public reacts to it.

Make no mistake: Tools that help creatives reach a wider audience are a good thing, but too often these platforms that help disseminate works worldwide at the push of a button are the very same platforms that pirates use to steal, share, and monetize someone else’s work as their own, also at the push of a button. Technology can solve difficult problems, but it can also cre-

ate new ones. While ushering in an unparalleled era of video sharing online, YouTube has unwittingly created a virtual playground for pirates. And the onus is on YouTube to do something about it.

Content ID was implemented in 2007 in an effort to curb the most egregious cases of copyright infringement. However, Google continues to pick and choose who is allowed to participate, and independent filmmakers and musicians that do not qualify to use Content ID are forced to spend hours policing the platform to find and remove stolen copies of their work.

Unfair burden on independent creatives

Recently, YouTube has, in fact, implemented changes to make Content ID “smarter,” but the copyright infringement tool still excludes too many independent creatives. According to a recent *Fast Company* article, Content ID is powered by reference content that comes from “...thousands of hand-selected partners, an arrangement that naturally leaves some blind spots when it comes to independent musicians and other rights holders.” These “blind spots” are otherwise known as thousands of independent creatives who suffer the most financially when their content is stolen.

In YouTube’s own words: “To be approved, [copyright owners] must own exclusive rights to a substantial body of original material that is frequently uploaded by the YouTube user community.” This puts a substantial, unfair burden on independent creatives who do not enjoy the financial backing of major film and television studios or record labels to invest in this kind of

unending whack-a-mole style enforcement – take one video down, another pops up in its place, on and on again, ad infinitum.

If you are on your own and your content appears on YouTube without your authorization, then you are really on your own.

Expansion could generate useful data

But it doesn’t have to be this way. Google thrives primarily on the proprietary data gathered from all of its platforms. In fact, user data is often how Google improves its products and services – by looking at how its customers interact with its services and adjusting issues accordingly with updates and upgrades. If Content ID were made available to all of its users, without exception, perhaps YouTube could unearth a new data-driven, crowdsourced solution to the problem of piracy on its own platforms that could serve as a model to be emulated by other tech companies that offer similar video and audio sharing services.

Quite simply, if Content ID works as well as YouTube claims it does, then why not just make it available to everyone? If Google and YouTube will not do more to stop piracy, then at least grant all creatives – big or small – access to the tools so that they can do it for themselves.

Transparency goes a long way toward building consumer trust. If YouTube creators and copyright holders have multiple grievances with Content ID as it exists today, Google should do what it does best – innovate and share it with everyone. Isn’t that what YouTube is all about anyway? ■



Ruth Vitale leads CreativeFuture, a coalition of 450 companies and organizations and more than 75,000 creative individuals encompassing film, television, music, book publishing, and photography. CreativeFuture promotes the value of creativity, expanded digital access to legitimate content, and the fundamental right of creatives to determine how their works are distributed.

Time to Face (Virtual) Reality

Optimizing infrastructure for modern digital experiences

By Bernhard Behn, Principal Technical Marketing Engineer, Avere Systems

Abstract: With cutting-edge IT infrastructure at the heart of immersive content experiences, many technologists in the VFX industry are faced with a harsh virtual reality check: their data center isn't equipped to handle VR workloads. Below we break down some of the top obstacles facing network operators and storage admins, as well as how they can overcome these challenges and optimize their infrastructure to deliver powerful, exciting virtual reality experiences.

Virtual reality (VR), once a figment of an imaginary, Jetson-like future, has emerged as a crucial part of modern digital storytelling. The media and entertainment industry is now not only defined by mind-blowing visual effects, but by human interactions with these creations through immersive virtual reality experiences. According to the 2016 *Digital Storage in Media and Entertainment Report* from Coughlin Associates, 21 percent of high-end movie content in 2016 will be 3D or VR based, and by 2021, we can expect 27 percent of high-end, 30 percent of mid-range and 20 percent of low-end movies to use multiple cameras for video capture.

In VR, bigger is better (and more challenging)

It comes as no surprise that virtual reality applications come with big capacity and performance demands, specifically bigger network connections and larger data centers to store, process, and distribute massive amounts of data. Reconstructing an interactive worldview requires production companies to store large quantities of pictures, bitmaps and textures. With so much data, they simultaneously require new levels of storage capacity, data com-

It is critical that studios build their infrastructure in a way that supports both the challenges on the development side, working within the software environment to serve up VR, as well as the presentation side, where users need a smooth experience with minimal slowdowns.

pression capabilities, compute power, connectivity and content distribution, all while maintaining budgets and avoiding latency in order to meet critical production deadlines and high end-user expectations.

The Coughlin Associates report noted that the total volume of estimated media and entertainment content captured and created by 2021 will be about 230 exabytes, pointing to VR as a significant driver of storage capacity and bandwidth in the next decade. With these enormous amounts of data come issues of data access, which can impact both the developers and the users. These data challenges are compounded by the need for constant uptime and seamless user experiences while also cost-effectively and efficiently distributing content to users.

It is critical that studios build their infrastructure in a way that supports both the challenges on the development side, working within the software environment to serve up VR, as well as the presentation side, where users need a smooth experience with minimal slowdowns. Here are three infrastructure considerations for studios looking to bring virtual worlds to life:

1. Make the most of cloud providers. An obvious option and the Holy Grail of infrastructure solutions, the cloud is undoubtedly the best choice for meeting the potentially elastic infrastructure demands of VR applications. In addition to major cost-savings, migrating to the cloud can provide studios developing VR apps with a number of benefits:

■ **Capacity** – When on site storage has reached its maximum capacity, cloud services can be added quickly and do not require additional floor space, shipping times, or com-

plicated installations. This can be an attractive option for VFX studios working with unprecedented amounts of data to deliver VR experiences.

■ **Data center decommissions** – Many enterprises are looking to decommission data centers entirely, by either consolidating the data into another location or creating a hybrid cloud infrastructure.

■ **Disaster recovery** – In order to ensure constant uptime and data availability, the cloud offers an off-site location to store dataset copies in any instance where an incident occurs and data recovery is needed. Having an easy recovery plan in place ensures that production deadlines are met, regardless of outages and other incidents.

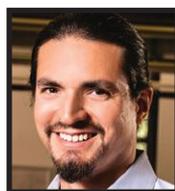
■ **Content distribution** – A critical piece of delivering a seamless VR experience, moving content from one location to another is made easier with cloud storage. Instead of shipping drives, large data sets can be retrieved from other locations.

2. Consider co-location. Often times, cloud providers or physical data centers may not be in all the ideal locations for VR users, making data access and satisfying performance requirements a challenge. In these instances, VR developers and providers may consider co-located data centers. By

contracting a data center in a location near hotspots of user activity, studios can enable effective data access that allows for scalability. It also eliminates many of the overhead costs for building and maintaining a new data center, which can put production and operational costs significantly over-budget.

3. Leverage a scalable caching mechanism. Once a digital studio has the data storage issue resolved through physical data-centers, colocation, the cloud or a combination, it is important to have a software stack that can run on top of the infrastructure to ensure smooth and scalable content delivery to the appropriate volume of users. Having a global caching mechanism in place will support content delivery for seamless user experiences, and minimizes the issue of additional baseline costs tacked on to each new site deployment, ultimately enabling organizations to scale and support a growing, global VR user base.

As the media and entertainment industry continues to experiment and the emerging virtual reality landscape continues to evolve, so will the demands placed on infrastructure. In order to bring life-like virtual worlds off-screen, VFX studios will need to get creative about how they meet increased storage capacity and data access requirements. With a growing variety of solutions already available on the market, the future for VR looks bright. ■



With over 15 years' experience in the networking and storage industries, Bernhard Behn's focus is on architecting, supporting, and maintaining clustered distributed filesystems, as well as testing high performance NFS/SMB environments with real world applications running on-premises and in the cloud. Previously, he was a Staff Engineer at NetApp. Prior to NetApp, Behn cut his teeth working at FORE Systems/Marconi.



In director Randal Kleiser's *Defrost*, VR enables viewers to experience embodiment as woman paralyzed after being frozen for 30 years.

Bringing VR to Hollywood

Using Virtual and Augmented Reality to create immersive, cinematic experiences for live-action storytelling

By Mario M. Kenyon, Head of Production, and Francine Marchetti, CC0/Executive Producer, Furious M

Abstract: Virtual Reality (VR) is catching fire in Hollywood. Global demand for VR content is about to explode. However, commercial success depends upon the ability of VR producers to understand the complexities of creating and finishing, high-quality, “AAA” content and finding an audience. Studios are actively engaged in production of 360° video, true VR and Augmented Reality (AR) projects. What is the difference between 360° video, true VR and AR? What are the benefits? How can Hollywood take advantage of these amazing technologies?

Virtual reality (VR), is the NEW big thing for narrative storytellers and production studios. For live action and animation, the process of creating quality VR starts with the story — which impacts almost every single part of production, post and distribution. With so much money being invested into this medium, it’s important to be educated and understand the many different formats that fall under the blanket term VR. These formats range from live action 360° video to computer generated (CG), real-time rendered experiences. The latter format allows for full immersion of multiple senses and interactivity that is commonly referred to as true VR.

So what’s the difference between 360° video, true VR, AR and their hybrids? To get a sense of how these different mediums compare and contrast we need to consider how each format is created and also how it is actually

consumed by the viewer or user.

The manner in which these different formats are consumed is very important and dictates the level of immersion. For example, mobile VR head mounted displays (HMD) like the Samsung Gear and Google’s Daydream do not currently allow for positional tracking, which means the user can’t physically move around in the virtual space. They can only look around from a fixed position. Desktop HMD like the Oculus Rift and the HTC Vive have positional tracking so they can precisely track where the user is sitting, standing or moving in the virtual space. These differences determine how a story is told, including the level of interactivity.

Virtual Reality

VR is categorized as an immersive multimedia or computer-simulated reality that replicates an environment that simulates a physical pres-

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The new dimensions of VR capture and expand the complexity of production planning and post, and as a result VR requires an updated workflow.

ence in the real world, an imagined world, or a hybrid of both. This allows the user to interact in that world. VR simulations artificially create sensory experiences that can include sight, touch, hearing, and even smell. There are actually headsets out there today that release scented odors that drive an olfactory response during the experience, as well as wearable haptic devices that recreate the sense of touch to the user through forces and vibrations.

360° Video

360° Video or Spherical Video employs video recordings of real world content as the core media. The real world content is recorded using a cluster of cameras pointed in all directions at the same time. The resulting footage is then stitched to form a single video. This stitching process is either done by the camera or through specialized software that analyzes common visuals to synchronize and link the different camera feeds together. With 360° video, the viewer has control of the viewing direction in playback but can't move in the space. The vast majority of live action 360° video today doesn't allow for positional tracking as a result of the camera. There is simply too much data to capture. However, Lytro will soon be coming out with a 360° camera that captures enough data that it allows for positional tracking of the users head when playing out on an appropriate HMD.

Confusion surrounding 360° videos is common. The debate typically centers on whether 360° videos should be categorized as VR at all. Much of the issue stems from the fact that 360° can be watched on a wide variety of devices, further complicating the meaning of VR. For instance: watching a 360° video on your computer or on a mobile device without a headset does not qualify as a VR experience. In that case, the user is not immersed in a simulated

environment. If the 360° video is consumed using a mobile or desktop headset, it can be considered VR, although achieving presence is much more difficult due to the lack of positional tracking.

This highlights the importance of creating high-quality or "AAA" storytelling, and why creating well-crafted stories is so important in this medium. The user must understand who or what they are in the context of the story; the more immersive the experience, the more impact the VR experience will have. When filming in 360° the creators can now think of the camera as the user. This creative transformation allows a director to tell a story from a first person point of view (POV) where the user becomes a character in the narrative.

Computer-generated VR

CG VR is an immersive experience created entirely from computer generated or animated content. CG VR can be pre-rendered and nonreactive, similar to 360° video, or rendered in Real-time using a game engine. Usually, pre-rendered CG VR is created to be consumed on a device that does not allow for positional tracking, real-time rendered CG VR, however, allows the user to move around in virtual space. Headsets like the Oculus Rift and HTC Vive have positional tracking, enabling the user to interact with their virtual environment through movement and controllers. This is considered true VR.

There are hybrids of VR that visually combine 360° degree video and CG to create an immersive experience using a blend of the two. Some of the more exciting VR content is being created using this approach.

Augmented reality

AR is an overlay of created content onto the

real world. The CG sensory input can be sound, video graphics or geo-positioning (GPS) data. Today, real world content and CG content are not interactive, however research is quickly advancing that will enable AR to become interactive with reality.

As is sometimes the case, stories need to wait to be told until the right technology comes along to tell the story. Such was the case with *Defrost*. Furious M has been working with Feral Dog Production's Tanna Frederick and her team on *Defrost*, a unique 12-part series directed by Hollywood legend Randal Kleiser.

Kleiser originally shot the first episode in 360° using a dual GoPro rig. *Defrost* is a live-action 360° video told in the first person POV, so the viewer becomes the main character in the story: a 30-year-old woman who has been cryogenically frozen and is reanimated 30 years later. In this VR story, the protagonist is paralyzed and unable to talk due to atrophy. Viewers tend to look down and see their body in the wheelchair, their brains slowly connect and they virtually become this character, also known as experiencing 'embodiment'.

While the 360° GoPro rig gave a sense of presence, Kleiser was after the feel of a stereo 3D - VR experience, and opted to shoot the remaining episodes using an early version of the new NOKIA OZO.

The production and post production of VR and 360 videos require meticulous planning and control. While the right camera choices are critical to the story, what the storyteller is looking to communicate in VR is reflected through the entire production's execution, data management, pipeline, stitch workflow and file finishing.

Camera choices and rigs range from two

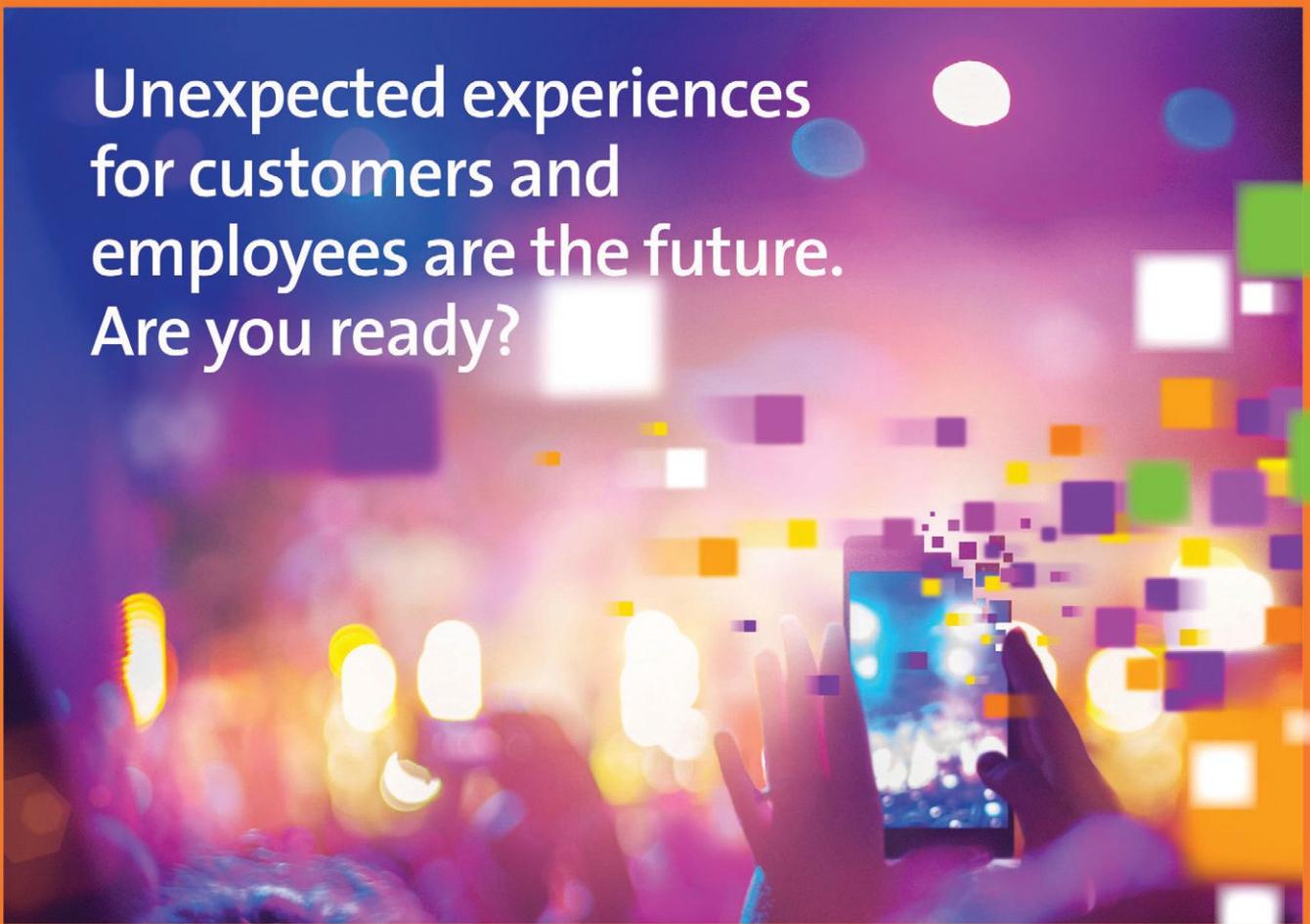
Continued on page 110



Mario Kenyon is currently working on projects to help shape the way VR is consumed by the public including his work on the revolutionary VR series Defrost. He is currently working with The Laboratory of Cognitive Neuroscience at the École Polytechnique Fédérale de Lausanne in Switzerland to construct experimental paradigms that test how presence and character embodiment in VR narratives affect the physiological and cognitive states.

Francine Marchetti is an accomplished senior executive and producer with extensive experience in film, television and digital media production, production and post-production management, as well as production pipelines in visual effects, animation, virtual reality and stereoscopic 3D for global entertainment.

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Managing Five States of Data for the M&E Market



Case study: The Montreux Jazz Festival's 50 years of data preservation

By Jeff Greenwald, Senior Director of Sales, HGST

Abstract: Like all M&E businesses, the Montreux Jazz Festival needed to understand the five stages of data that are being generated every year for the last 50 years. They had to create workflows that met their budgets, solved their performance targets, and met the organization's SLAs within the technology constraints at hand.

All media companies, whether a post house, a game developer, an advertiser, a CDN, a movie studio or a broadcaster wrestle with data in five states: Data in Use, Data in Motion, Data at Rest, Data in Archive and Data Deleted. The challenges in managing this wide variety data are straight forward and simple:

- 1) How do you lower the cost of that data?
- 2) How can you accelerate the performance of moving data through the media workflow faster?
- 3) How do you archive and protect your assets, the right assets, without over-storing, and without throwing out or deleting data you'll regret losing later.

The Montreux Jazz Festival (MJF) in

Switzerland, which got started 50 years ago in 1967 by a visionary named Claude Nobs, had great insight into its future data needs. Rare exceptions apart, the MJF organization video recorded all of its jazz, blues and rock concerts. It recorded Ella Fitzgerald in 1971, David Bowie in 2002, and in-between, Nina Simone, Etta James, Marvin Gaye, B.B. King, and hundreds of other performers. MJF realized how important these video recordings were going to be, and understood that technology would ultimately allow assets to be preserved, to be made available in subsequent generations for research, review, as well as enable potential distribution, collaboration and even monetization (once digital rights management issues had been clarified).

The MJF was one of the first organiza-

Q&A: EPFL's Responses to the Questions Posed in this Article

How many copies of the recordings do you keep?

Three (two sets of LTO tapes plus one geo spread Active Archive System on three sites).

Do you use a cloud service...?

No, because of the rights and sensitivity of the data,
... Or establish a private cloud in-house?
Yes

Even after digitization of the concerts, do you preserve and keep the tapes?

Yes!

Do you really need to keep all 15 generations of tapes going back to 1967, even though it is nearly impossible to even find the tape drives to playback these old tapes?

Yes! Mandatory from UNESCO.

Do you really need to recycle the tapes to prevent deterioration?

Yes.

Do you use a one-site archive, a two-site asynch site, or a three-site geo spread configuration?

Three site geo spread configuration for one copy of the archive (other copies are on 2 LTO sets).

How do you test the archive?

MD5 Signatures, periodical re-read of the LTO files.

Against what volume of users?

Not yet known. We'll see from the 3rd of November, at the opening of the Montreux Jazz Café @ EPFL.

Do you expose the archive outside of the Festival's firewalls?

Yes, MJF website, Montreux Jazz Cafés, and EPFL Café

How do you allow students at EPFL to access, edit and metatag the various files?

Fully opened thanks to the "Education and Research exception on Author's Rights," which is available in Switzerland. Edition and annotation follow precise processes defined by the Metamedia center.

tions in the early 1990s to record in HD. Today, in a partnership between the Claude Nobs Foundation and the Metamedia Center of EPFL (the Swiss Federal Institute of Technology in Lausanne), it is digitizing everything, and in parallel is exploring new technologies such as 3DAudio and 360° video captures, and many other innovations, including an object storage system for the 5,000 hours of uncom-

pressed concerts archived. The collection is now registered at UNESCO, as part of the "Memory of the World" Program.

The Metamedia Center had to manage and answer all the same kinds of questions routinely asked by many M&E companies:

How many copies of the recordings should they keep? Should they use a cloud

Continued on page 112

The 5 Types of Data

Data in Use — Data under constant change: reading and writing, editing, colorizing, enhancing, lighting. It's all data being "born."

This could be data from ingest moving along the media workflow, or data being created with VFX tools. Data in use needs speed, accessibility, and sometimes multiple users need it simultaneously. Sometimes data in use is real-time streaming.

Data in Motion — Data on its way to or from the storage media, in different places, going to or from cameras and devices, people and infrastructure. It's data in transit.

From a camera, to a device, across the city, across the country, from an up-link, from a truck at the sports stadium, etc. This type of data requires high availability and low latency accessibility. Jitter and low data durability also negatively impacts workflow throughput.

Data at Rest — Data that is written and stored on storage media; online, nearline, offline or in the cloud.

This type of data is often replicated, copied, protected and backed up. It's even written to different types of media and often written to different locations, and with different technologies. Some Data at Rest stays at rest. Some Data at Rest is placed back in the data in use bucket, and then re-used and edited and re-purposed and then re-used over and over again.

Data in Archive — Data that was stored initially on a tier 0-1-2 device and now might be accessed with regular, or irregular frequencies.

This is growing rapidly.

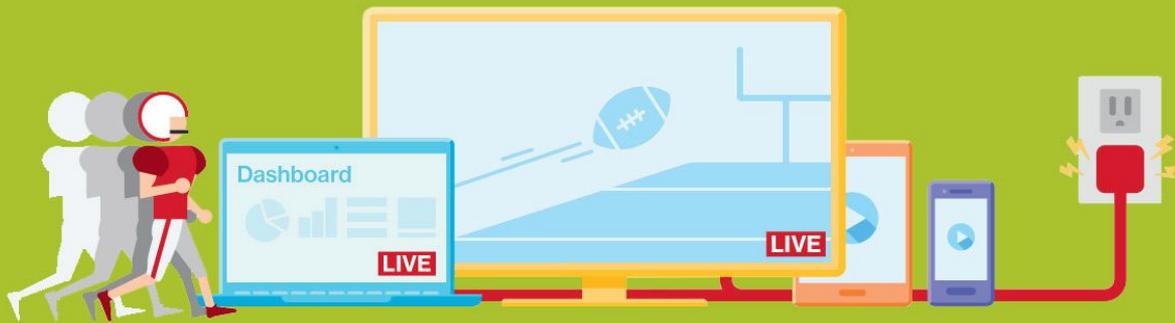
Data Deleted — Well, almost never! You don't miss it until you delete it. Almost no one is deleting anything nowadays. That contributes even more to the Data in Archive.



Jeff Greenwald's team at HGST, a Western Digital brand, delivers industry solutions that provide vertical market workflows for customers in media, broadcast, post-houses, gaming companies, and telecoms. He has more than 25 years' experience in these markets, and has lead vertical and product marketing teams at IBM, Sun Microsystems, and most recently at Hitachi Data Systems.

How to Power a Live Video Event

Five technology upgrades needed to meet the demand for streaming live events online



By Ralf Jacob, President, Verizon Digital Media Services

Abstract: Live video is officially media's Next Big Thing. But as everyone who's ever tuned in to a major awards show or sports championship game online knows, when it comes to large national events with millions of viewers, streaming video quality is often hit-or-miss. Streams freeze up or cut out altogether. And that's only if authentication issues don't keep viewers from signing in to begin with. For live video to reach its full potential, these are issues that need to be solved—and quickly.

Many OTT providers' platforms were designed with VOD in mind. But live events are a completely different animal, with their own unique challenges—challenges that require robust, specialized infrastructure to meet. Here are five ways OTT providers need to upgrade their technology if they're going to meet the exploding demand for streaming live events online.

1. Be ready for spikes in viewership

One major difference between live events and VOD is that with live, a huge chunk of your audience will be tuning in at the exact same time. Maybe it's at the beginning of your broadcast, or maybe it's in the nail-biting fourth quarter of a tight playoff game. In either case, your infrastructure must be capable not only of managing 10 million-plus sessions concurrently, but also of creating tens of thousands of new sessions each second—even when you aren't expecting it.

That means having servers ready to handle surges in viewership. And I mean big surges. When you hit capacity during a live event, don't just scale up one more server—scale up 100 more, in case demand keeps growing.

2. Optimize for quality

Delivering quality live video to huge high-def screens is its own challenge. With VOD, high-quality chunks of a popular video are usually already encoded and cached at the edge before the viewer even tunes in. Delivering those chunks to a 70-inch TV or another high-resolution screen is relatively fast and easy. With streaming live events, however, the content source can come from remote locations, with less than optimal connectivity, leading to delays.

To meet this challenge, providers need to optimize every step of the

digital media supply chain. Workflows for contributing, ingesting, encoding, packaging and delivering content to the edge need to be streamlined to squeeze out any additional steps that slow a stream and pull viewers "behind live". For example, at Verizon Digital Media Services, we build our edge node capacity so they're only working at 30 percent to 35 percent utilization at any given moment, with enough headroom to handle a spike in traffic if needed. We've found that this is an important factor for getting video from encoders to origin storage to edge nodes as quickly as possible, while ensuring minimal delays for viewers.

3. Streamline the process for dealing with the live event lifecycle

As if that weren't complicated enough, there's another major issue that comes with streaming live events that is foreign to on demand or scheduled linear broadcasts: Live events are unpredictable. Rarely do they start exactly on time. Commercial breaks happen at unpredictable times. Rock stars are mercurial—music sets can end abruptly or run long. Without the appropriate tools, this can be a nightmare for producers.

Each stage of the live event lifecycle, before the event, during the event and after the event pose different challenges. Before the event, audiences should see a message that confirms that the live stream is working, through dynamic slates or a countdown clock, to avoid panicked users flocking to Twitter to complain. During the event, producers need to be able to quickly switch between slates or commercials, depending on what is happening in real-time at the venue. And after the event, users don't want to wait 24 hours to watch the event again. The highest levels of audience engagement (and opportunity for additional revenue), happen immediately following the event.

Failing to deal with your stream or users at any stage in the lifecycle

will lead to unhappy customers and the potential for lost revenue.

4. Work to bring down costs

Expense is a huge barrier to entry for live streaming, particularly because the expected audience size is hard to predict. Without a previous event to establish precedent, modeling the costs of streaming against predicted revenue can be a challenge. The big question for live event producers: when it comes to streaming live video, what is the ROI?

It seems clear, at the same time, that live events should be at the heart of OTT. No one wants to tune in and not be able to watch breaking news online. It's up to us OTT providers to bring down costs so that it's possible for anyone to stream live events from sports leagues to venues and even local news affiliates. That means streamlining processes, simplifying setup and above all, driving advertising deals that make the financials work.

Live video is an unprecedented opportunity to target advertising at individual viewers, rather

than broad demographic segments. But all too often, this opportunity gets lost within OTT systems cobbled together from multiple vendors and designed without a cohesive vision. With a little bit of planning, along with the ability to target users via a 1:1 relationship, live event producers can attract the right advertisers on the right terms and capitalize on a captive audience. More relevant ads mean happier viewers, which means more viewers, which means more ad revenues. And a unified plan for live video streaming is all that it takes to create that positive feedback loop.

5. Prepare for the future

Live event producers should also look to the

future when designing infrastructure to handle live video. Maybe they only need infrastructure to handle a handful of viewers today—but what happens if a million viewers tune in tomorrow? What if those viewers want their content as streaming 360° virtual reality, or streamed to some device that hasn't been invented yet? What if every one of them had their own customized feed of live videos tailored uniquely to them? We haven't yet seen the full potential of live OTT. Live event producers should be thinking ahead to these "what ifs" and others to guide them as they plan their next 10, 20, or 30 years of OTT strategy.

With contribution from the Hippo Thinks research network. ■



Before becoming President, Ralf Jacob served as Chief Revenue Officer for Verizon Digital Media Services, the industry's only single, end-to-end digital media platform that can prepare, deliver, display and enable the monetization of online content. He brings more than 21 years of technical, sales and executive management experience to the organization. Previously, he was the CEO / co-founder of upLynk, which Verizon acquired in 2013.

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Ultra HD Blu-ray Brings Forth Ultra-Workflow Challenges

Evolution impacts video compression, authoring and quality control

By Bhanu Srikanth, Chief Technology Officer, Giant Interactive

Abstract: With the spectacular changes in picture quality delivered by the new Ultra HD Blu-ray, it's no surprise that equally significant changes have been required in the production cycle as well. Leading up to the release of the first Ultra HD Blu-ray titles, post-production facilities quickly discovered that they needed to adjust their processes and workflow. Video compression, authoring, and quality control have all evolved in the last six months to facilitate Ultra HD Blu-ray production.

Ultra HD Blu-ray is technically an extension of Blu-ray from a standardization perspective, but it has necessitated extraordinary changes in the post-production workflow in every phase of the production process.

Unlike Blu-ray, the Ultra HD Blu-ray specification supports High Dynamic Range (HDR) color space, which allows a greatly increased contrast between light and dark images on the screen. The result is a much more realistic image. The HDR specification provides for a default 10-bit HDR that supports increased color space (Rec. 2020), with other optional HDR formats

available. The specification defines parameters that make up this information, but it doesn't define a standard format for exchanging this data. For the enlarged HDR color space to work precisely within the disc mastering workflow, information from mastering such as range of luminance levels used need to be incorporated much earlier in the production process, affecting both video compression and authoring protocols.

Menu design

Menu design also needed an overhaul to accommodate both the graphics plane's HD resolution and its visibil-

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To accommodate the larger data requirements of 4K video, Ultra HD Blu-ray Disc configurations have also adjusted, supporting larger 100 GB, 66 GB, and 50 GB disc capacities

ity against HDR background video. The graphics plane in Ultra HD Blu-ray is not in 4K resolution; it's still high-definition (1920x1080). Upon playback, menu graphics will be automatically scaled to 4K (3840x2160) by Ultra HD Blu-ray players, compelling designers to conceive and create menus that will not lose integrity with upscaling. The design also needs to take into account the perceptibility of the menu against both a High Dynamic Range video, as well as down-converted Standard Dynamic Range (SDR) video when playback doesn't occur on HDR displays.

Subtitles

This same concern also applies to subtitles. The industry tackled this in a different way, however, since most subtitles have a consistent look and usually employ only one or two colors. To avoid changing the subtitle workflow, tools were developed to enable automatic conversion of the subtitles from SDR to HDR at the authoring stage.

Quality control

Both authoring and quality control (QC) departments also have to reckon with the increased quality checks needed for Ultra HD Blu-ray discs. With previous formats, video QC was predominantly about checking for blocking or artifact issues in compression; now there are the additional concerns of proper color reproduction and brightness levels.

This issue alone is complex and nuanced. Various settings in both the player and television can affect the output differently, which can lead to a disappointing consumer experience. Modern displays in consumer homes fall under one of three categories – SDR/HD, SDR/4K or HDR/4K displays. Quality

control reviews must check against each of these types of displays. Complicating matters further, the Ultra HD Blu-ray specification allows for authoring to use one or all three optional HDR-to-SDR technologies or even leave the choice to the playback device. To ensure good picture quality across all players, televisions, and various settings, quality control must check all of the different combinations so that the original intention of the content creator is preserved with respect to color, brightness, and conversion.

To accommodate the larger data requirements of 4K video, Ultra HD Blu-ray Disc configurations have also adjusted, supporting larger 100 GB, 66 GB, and 50 GB disc capacities. In production, authors must consider how to optimize each disc layout to maximize player performance. To accommodate a higher bitrate, a special logical layout called “dual zone” can be used. It places the higher bitrate content on the outer area of the disc, enabling the player to read more bits at a time. Although this feature doesn't affect the workflow drastically, the option to produce a dual zone disc needs to be considered carefully in the planning stage. Switching to a dual zone configuration at a later stage can have an enormous impact on the timeline. Much of the content will need to be re-encoded, the disc image rebuilt, and all quality checks repeated.

Security

Adding to all these workflow changes is the introduction of AACS 2.0 in the Ultra HD Blu-ray specification, which provides increased protection against unauthorized duplication or transmission. If an Ultra HD Blu-ray title uses the newly enabled, advanced features such as forensic watermark and correction keys, the workflow will undergo further changes as these affect the way the video is encoded and a disc is built and tested in a very fundamental way. Currently several facilities including my company are testing out these features in order to understand how and where the changes must happen.

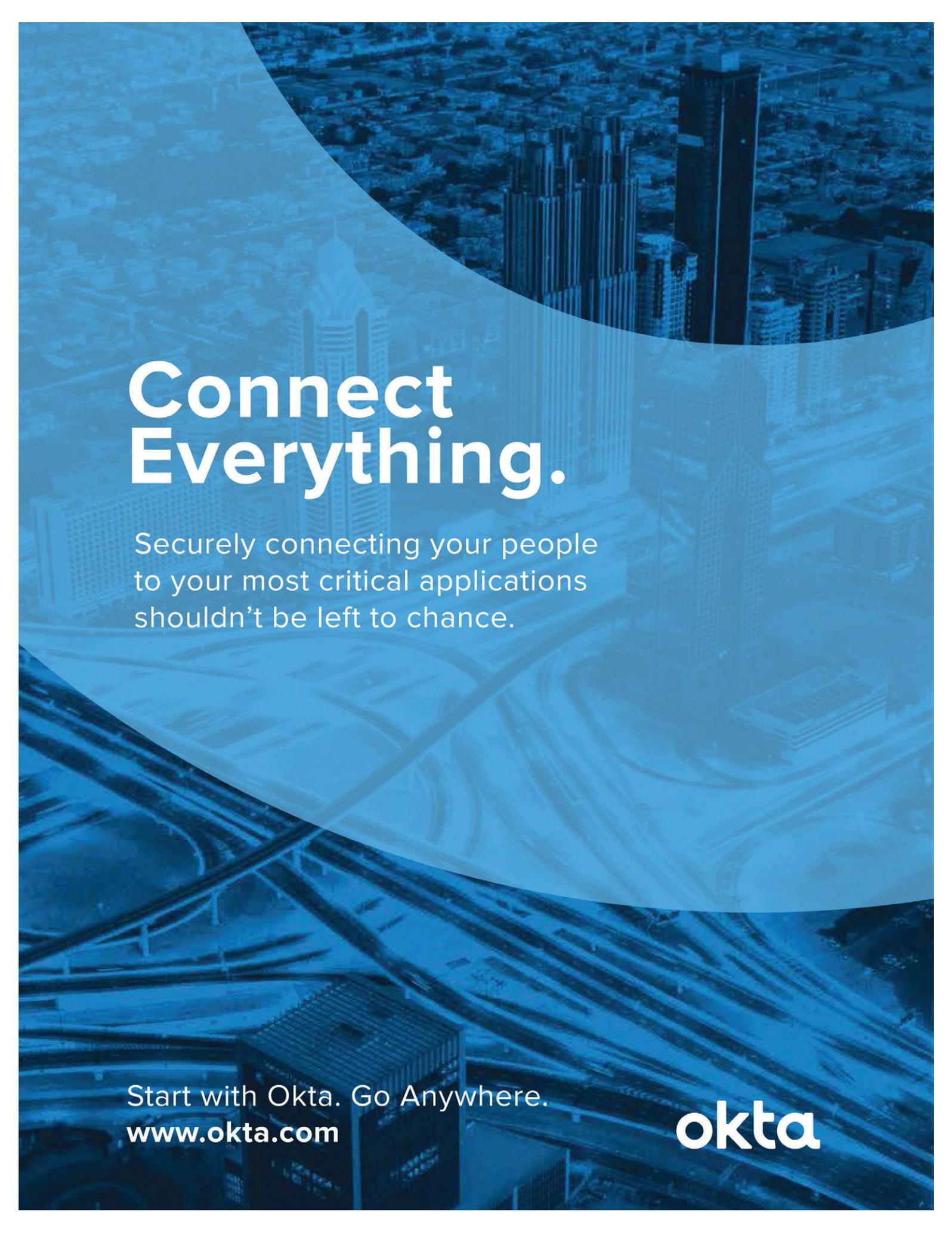
Creative now needs to consider designing menus against Standard Dynamic or High Dynamic Range video and must ensure the design stands up to the required scaling. Subtitles need to be adjusted to ensure they are perceptible against HDR video. Mastering metadata needs to be communicated to compression and authoring. Quality control's scope has increased vastly; content needs to be tested on different types of displays, as well as different player settings in concert with each display.

Format evolutions such as HD to UHD do considerably disturb preexisting processes and workflow, but who is complaining when the result is such a stunning improvement in picture quality and viewer experience?

Certainly not movie lovers everywhere! ■



Bhanu Srikanth is responsible for overall technology strategy as well as development of software solutions at Giant Interactive. Srikanth co-founded and lead Jargon Technologies (which was acquired by Giant earlier this year), working with Hollywood studios to deliver entertainment in innovative ways on disc and mobile. Earlier, she was part of the core R&D team at Panasonic Hollywood Lab that developed and evolved the Blu-ray format from pre-conception through format standardization.

An aerial photograph of a city, likely Dubai, featuring prominent skyscrapers and a complex highway interchange. The image is overlaid with a semi-transparent blue circular shape that frames the text.

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Digital Disruption: We've Seen This Movie Before



M&E companies can write a different ending than publishers have by meeting the new digital first paradigm with strategies for personalization, monetization and innovation

By Steve Sobel, Global Director of Media Industry Solutions, Salesforce

Abstract: Digital has fundamentally and forever altered the print publishing business. Are broadcasters and studios headed to a similar fate? How will OTT, the fraying of the cable bundle and a changing ad market affect content producers? While a definitive time and end state for the industry is hard to predict, one thing is clear: legacy content producers must fundamentally change the way they do business.

Winners in this new paradigm must personalize, monetize and innovate to stay ahead of the impending disruption—or else.

Publishers who did not adapt their business models, products and processes to the emerging demands of their consumers are struggling—some even have vanished. Ten years ago or even less, these publishers were certain that, despite the signs on the horizon, their successful businesses of the past would flourish for another one or two decades—or at least until they retired.

As M&E companies seek to avoid the same fate and adjust their businesses to the new digital first paradigm, three key themes have emerged:

Personalize: life beyond DMP

Data Management Platforms (DMP) and ad targeting have been the key drivers for content producers looking to drive traffic around their products and releases. DMPs haven't just been at the functional center of targeting the right ads for the right

consumers, they have also been where many media companies have put the bulk of their financial and technical resources as well. Today, more progressive media organizations are architecting their businesses for a world where advertising is one lever of an arsenal of tactics to move consumers from anonymous to advocate. Ad blocking and efficacy are certainly headwinds that won't be going away anytime soon—and content companies need to have tools in place that will allow them to engage consumers beyond paid media. In a world where a mass distribution approach to content has been replaced by the need to drive one-to-one journeys around content to meet consumers' growing expectations, media companies must take a considered approach to understanding who is on the other side of their content. They must ultimately deliver what every single consumer demands and use these consumer insights to foster new, tailor-made businesses beyond advertising and paid content.

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Monetize: everything as a strategy

The embrace of a “one size fits none” model has media executives thinking very differently around their content monetization strategies. While in the past this strategy was rather simple—focusing on paid content through various channels and monetizing the consumer base through non-targeted or smart advertising—the landscape of monetization has become more complex in terms of models and partners. In a recent interview at the Needham Emerging Technology Conference, CBS Chairman, President and CEO Les Moonves said that, while Netflix produces its own content and competes with CBS for eyeballs, CBS views new entrants as “more friend than enemy.” CBS is not alone in taking a once enemy, now friend approach to monetizing its content—and the distribution mechanism for content producers now requires more strategic dexterity than ever before.

Growing the core business while enabling direct-to-consumer partners as a channel, merchandising, super fans as a sales channel are all conversations that media executives are having in terms of revenue growth. Data is now a proven opportunity not only to drive direct incremental revenues from paid content through audience analysis and ad-funded businesses—it is also a powerful accelerator to discover and execute on new business models, leveraging audience insights and reach. Those that are strategically nimble will be able to capture on these new monetization opportunities.

Innovate: MVP rules

Being strategically nimble requires a new model on which companies execute their digital product strategies. In a new world order, where content companies need to do many things well, digital media organizations are more focused on testing the waters with a minimally viable product rather than boiling the ocean with a heavy approach to product development. Admittedly, this is a 180-degree shift from how editors, writers and content producers in media companies used to work. But the new reality is that your strategy a year from now might largely be different than it is

In a world where a mass distribution approach to content has been replaced by the need to drive one-to-one journeys around content to meet consumers’ growing expectations, media companies must take a considered approach to understanding who is on the other side of their content.

today—and this requires the ability to launch quickly and cost effectively. Because companies need to be more agile in their executions, the risk of having technology platforms that inhibit this speed is significant.

Cloud has been a powerful enabler of getting technology organizations out of the infrastructure business, allowing media technology executives to better align to the needs of their business stakeholders. While cloud is the enabling technology to help build things faster, its clear that the consumer imperative for one-to-one relationships and the business driver of needing to make every channel a content channel are forces of change within the industry.

So, what’s a media executive to do to stem the tide at this time of increasing velocity for change? There are already winners and losers in this marketplace and winning is predicated on embracing these tactics:

One-to-one: Media companies must first personalize engagement, delivering one-to-one consumer journeys everywhere. While everyone focused on Netflix as driving an exceptional user experience, it’s for good reason: while Netflix has great access to content, it’s certainly not endless. What it does well, however, is recommend content that is targeted specifically to a customer based on past consumption behavior. This one-to-one approach to content must be built into any new product to keep ahead of consumer expectations.

Simple: The signup, billing and retention journey for a consumer must be easy and fric-

tionless. While Amazon pioneered one-click shopping in retail, consumers expect the same of their OTT, news and other content apps. Content companies must think hard and long about a mobile user experience that surprises, delights and is seamless from beginning to end.

Fast: One-to-one and simple seem somewhat obvious for consumer expectations, but these demands can only be enabled when IT is focused on agility rather than keeping the lights on. Media companies need a future-proofed platform that allows IT to stay ahead of the changing demands of businesses and drive innovation in the form of new engagement models.

The ability to personalize, monetize and innovate are all part of the foundation from which media companies need to build their digital futures. In this world of transformation, media and entertainment companies need to focus on their core business: driving a best in breed practice around content and experience. But they also need to focus on creating a personalized experience for consumers that maximizes revenue potential across all channels with an agile delivery methodology.

Publishers are still reeling from not proactively addressing consumer, industry and technology demands as the early signs were appearing with the advent of the web in the late 1990s—and they provide a cautionary tale for studios and broadcasters fortunate enough to have these learnings as a case to transform their businesses now. ■



Steve Sobel is charged with solution development and account support for some of the world’s most prominent media organizations spanning broadcasting, publishing, business information, entertainment and new media. He joined Salesforce in 2013 after serving as a SVP at Omnicom in the entertainment space, where he was responsible for product and marketing strategy.



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Accelerating Media Production Workflows with Intelligent Scale-Out Storage



Intelligent systems can help meet escalating capacity demands, heighten visibility and drive innovation

By Mike Bott, Principal Systems Engineer, Qumulo

Abstract: Here, we'll take a look at three media & entertainment organizations that have successfully made the transition to smarter storage systems. The adoption of intelligent scale-out storage increased the business value of their media assets while ensuring scale, uncompromised protection, and high performance. The end result was an increase in productivity, reduction in costs, and several other benefits we'll explore in detail below.

M&E organizations are continually seeking ways to increase the business value of their media assets and stay ahead of the curve by merging creative talent with technological breakthroughs. Storage infrastructure plays a crucial role in M&E companies' ability to store, manage and curate their vast and rapidly growing libraries of content. In order to meet these demands, intelligent scale-out storage systems have become essential for providing real-time visibility into the data footprint, storage, usage patterns and other factors impacting performance and capacity.

Breaking down intelligent scale-out storage

The newest scale-out storage systems have been deemed "intelligent" because they have real-time analytics built directly into the file system. They are designed to drive productivity throughout a vast range of workflows, from M&E environments to

The newest scale-out storage systems have been deemed “intelligent” because they have real-time analytics built directly into the file system. They are designed to drive productivity throughout a vast range of workflows.

automotive, life sciences, oil and gas, and more. These technologies have the ability to easily and non-disruptively scale a single file system to manage and curate enormous numbers of digital assets, making them a particularly useful tool within the M&E space. Storage administrators now have the capability to scale storage infrastructure on-demand, grow their working archival storage, and scratch environments based on business and client needs. Intelligent scale-out storage systems provide real-time visibility into a company’s data and storage, helping to solve the plethora of data management problems often left over from first generation technologies.

Meeting rapidly escalating I/O and capacity demands

After an award-winning visual effects studio began using more powerful I/O-intensive VFX software, it found that it was growing too quickly for its old storage solution. It primarily leveraged its storage for work-in-progress projects and rendering, using such programs as Autodesk’s Maya digital 3D modeling and animation software, The Foundry’s Nuke (a compositing and finishing tool) and most recently, The Foundry’s Katana lighting and look development software.

The company had recently more than doubled in size and began taking on increasingly demanding projects and using I/O intensive applications. Knowing that the continued use of its existing storage system would result in major performance problems, it chose to implement an intelligent and scalable storage solution with real-time analytics providing actionable intelligence on data and storage usage. Built-in analytics gave the team real-time performance visibility, allowing them to immediately recognize hot files and directories as well as misbehaving clients in order to ensure that the artists’ workflow was not impeded. The company found the availability of real-time information regarding capacity and usage, and the ability to easily share that information

with users, to be huge benefits of the built-in analytics.

Gaining visibility to handle peak rendering

Leading up to a large industry convention, a creative content agency saw its existing storage system slowing to a crawl. Continually facing crushing peak design and rendering workloads leading up to major events, the company turned to an intelligent storage solution for operational visibility and the integrated analytics needed to keep storage performing at scale. The company specializes in award-winning campaigns and content for major motion picture studios, television networks, video game publishers, and consumer brands. The staff relies on a Windows-based compute cluster for rendering, often for large format projects that span massive video canvases, sometimes using 4K or higher resolution.

During peak season, the company doubles the size of its rendering farm and nearly triples its workforce. Finding that its existing storage system was continually experiencing performance issues and falling behind, the company knew it was time to make a change. It made the move to an intelligent scale-out storage solution with analytics that improved productivity by proactively identifying potential bottlenecks before systems became impacted. Perhaps most importantly, the switch greatly increased the company’s scalability and elasticity to handle peak performance loads like those it experienced before large industry events.

Driving innovation through data visibility

Another media company that made the transition to intelligent scale-out storage is known

for offering a broad range of rich sports entertainment and analysis products that rely on vast amounts of video and metadata. It recently began placing a heightened emphasis on the data services aspect of its business. This entailed storing a vast catalog of proprietary sports statistics and video, and later selling the information for use in sports broadcasts, web-based content and consumer mobile apps. After experiencing substantial business growth, the organization started struggling with storage capacity and data management at scale. IT had difficulties keeping assets online and available for developers, and the company relied heavily on tape-based storage to try to cost-effectively handle the sheer volume of data being ingested. The existing storage system also didn’t provide insight into its data, leaving little room for actionable insights and innovation.

The company made the switch to an intelligent storage solution that empowered its team with real-time visibility into data and usage at the file level, in addition to insights regarding performance consumption, to ensure adequate IOPS. This enhanced visibility resulted in immediate and tangible business benefits. The company gained the ability to quickly determine what data to save or archive, what data and directories were hot, and what hadn’t been touched in six months or a year. Lastly, analytics further facilitated workflow for the organization’s by giving ready access to key insights through metadata.

Intelligent storage for visibility and success

As technological advances continue to create new demands for M&E organizations, the ability to efficiently store, manage, and curate data will be of paramount importance. The newest generation of intelligent storage systems are key to gaining real-time visibility into the data footprint, usage patterns and much more. These real-time analytics drive innovation and ensure that business processes are carried out smoothly and reliably. ■



Mike Bott has worked with high-performance large-scale storage in media- and HPC-focused environments since the mid-1990s. He has worked with manufacturers and systems integrators including Isilon Systems, DataDirect Networks, and FusionStorm. Mike has also built and managed systems and software engineering organizations in data transport and gaming businesses. He enjoys developing hacks, people, tools, teams, software and companies.

Getting Users to Give a Damn About the DAM

Driving user adoption begins early and continues through the DAM's operational life.

By Alan J. Porter, Senior Product Marketing Manager, OpenText



Abstract: M&E companies now produce more digital content across more channels than ever before. This means thousands of users, across departments and locations, who need digital media for every project, all under short timeframes and budget constraints. The answer is invariably to implement a Digital Asset Management (DAM) project of some variety. But how do you ensure that once it is implemented that people will actually use it?

Wasn't it a movie that famously coined the phrase "Build it and they will come?" It's a sentiment that may work as wish fulfillment, but unfortunately it is all too often still the underlying philosophy in the implementation of large technology platforms. No matter how well researched, written and developed the business case for a new piece of technology is, it will fail if those who are intended to benefit the most don't actually use it. Adoption is not something that just happens, you have to work at, and work at it from the earliest stages.

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Involve a subset of the key users in the platform selection process. Make sure that the user voice is heard alongside that of the business and technology people.

group at a major equipment manufacturer and we faced just this challenge. How do you support thousands of users around the globe to use and deliver brand appropriate imagery and video across multiple delivery channels? The DAM solution we implemented was pitched and funded on the basis of the needs of the main corporate website, but over the course of the first eighteen months after installation my team grew it to become a true enterprise solution with over a million assets and eight-thousand users; and it is still growing at an almost exponential rate. The following outlines just a few of the lessons we learned in helping achieve that level of user adoption.

Early engagement: Involve your stakeholders and key users from the very beginning. Include them in the needs analysis. Get them to help you identify gaps, and define the business process around how, and why, they use images the way that they do. Ask what they like, and dislike, about any current systems. If you have new arrivals from other companies or industries, find out what they thought of other systems that they may have used elsewhere. Most importantly find out what your users need to make their day go easier. As a hint, find and include your most vocal critics, bring them into the team, develop a sense of ownership, and they can become your strongest advocates.

Solution selection: Involve a subset of the key users in the platform selection process. Make sure that the user voice is heard alongside that of the business and technology people.

User acceptance testing: Have the same

set of key users be a part of the user acceptance testing. Give them the right of veto. Ensure that their feedback is taken seriously, and that they see the results of that feedback in visible fixes to process, or even the platform itself. This all continues to help build a sense of ownership around the DAM even before it is rolled out.

Phased roll-outs: Don't try and solve every problem across the whole organization at once. Have a systematic phase roll-out plan. Start with a small self-contained business unit or group where you can fine tune and measure the results. Get user feedback and then fold those into the wider roll out. Start small and work towards planned growth.

Communication is key: From the earliest days of the project develop a regular communication cadence (email, wiki etc.) to all interested parties. Keep it going during implementation, testing and roll-out. Be transparent about problems and fixes. Include tips and tricks, and promote success stories.

Open forums: During the early stages of each phase of the roll-out hold open forums (usually a regular one-hour conference call) that follows an 'ask me anything' format with both systems admin, IT and selected power users available to answer user questions and concerns. You may end up answering the same questions over and over, but it pays dividends in the long run.

Boost the search results: The prime use of a DAM for the vast majority of users is to be able to search and find the correct digital assets they want, quickly and easily. If they

can't find it on your DAM, they will revert to using mainstream uncontrolled search engines. So you need to develop meta-data models that deliver results. Make sure that search works, and works well.

Prove the benefits: Take measurements and develop metrics that show that using the DAM increases productivity, saves money, makes it easier to find the right assets, removes the potential for rights violations, ensures consistent brand messaging etc. Find what resonates from a results point of view with your executives, and your users, and measure it, then report the successes.

Socialize the use of the DAM: Talk about the DAM whenever you get the opportunity. One of the most effective ways to spread adoption is by word of mouth. If people enjoy using the DAM, get better results, and it makes their life easier, then they will be happy to share the news. Reinforcing that word of mouth through other channels such as "lunch & learn" type sessions, newsletters, webinars, presentations etc., helps build a critical mass of awareness.

As you can see from the above, getting people to use a new platform like an enterprise wide Digital Asset Management system isn't something that's tacked on at the end of the process. If you "build it" and expect them "to come," then you are already too late. Driving user adoption begins at day one and is a continuous process through the DAM's operational life. You need to show that what you are doing really matters. All it takes is the right planning and creativity as well as a healthy dose of change management by communicating the ease of finding, sharing and using digital assets to increase productivity, deliver memorable content and improve customer experiences across channels. Do all that and you will develop users who give a damn about your DAM. ■



Alan J. Porter leads marketing for the OpenText Customer Experience Suite. He is a regular writer and industry speaker on various aspects of customer experience and content strategy. Twitter @thecontentpool



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Audio Description: Television's Talking Book

AD is now a common feature of filmed entertainment, but its creation is still a complex process requiring a clearly defined workflow

**By Veronica Hyks,
Head of Audio Description,
BTI Studios**

Abstract: Audio description (AD) has allowed millions of visually impaired people to enjoy the programming and films many of us take for granted — and the service is still growing. Pioneer in the field Veronika Hyks discusses the evolution, benefits and possible future development of AD.

Audio description (AD) was once a concept known by very few in the TV and film industries, and practiced by even fewer. Today it is, if not the norm, certainly not unusual. Put simply, AD is a scripted narration that is woven into a television program or feature film to describe those aspects of a program that visually impaired people might miss.

That's a large potential audience. While the precise level of demand is not known, according to the World Health Organization, 285 million people worldwide are estimated to be visually impaired.

AD may sound fairly straightforward. But in practice it can be a complex process, requiring a clearly defined workflow and a well-briefed writing team. It also requires a lot of sensitivity to do correctly.

That's because the role of AD in a TV pro-

gram or film is not to be the star of the show or distract the listener. AD should carry the plot along in an interesting, articulate but subtle way, allowing the dialog, sound effects and music to speak for themselves. An AD script and track must describe only what is essential, adding color and texture where relevant, and using language appropriate to the visual presentation.

A reasonable comparison might be a talking book, conjuring up pictures and characters, absorbing the listener in the subject or story. It is not a blow-by-blow description of every move and every gesture. Neither is audio description.

The origins and drivers of AD are well known. It was based on legislation that came about after a lengthy EU/ITV/BBC-funded research project concluded that AD should exist alongside subtitling and signing. A re-

While the precise level of demand is not known, according to the World Health Organization, 285 million people worldwide are estimated to be visually impaired.

quired percentage of hours when AD would be provided was agreed and all terrestrial TV channels were obliged to begin the service back in 1996-1999.

Since then, of course, satellite channels and film distributors have come on board with AD, although the percentages of output with AD vary depending on a channel's viewing figures.

AD has a fairly strong presence in cinemas

In much of the developed world a number of showings of popular films also offer a headphone-delivered narration track. Warner, Disney and Sony are among companies that committed from an early stage to make AD available to viewers of their films.

Done properly, the AD process is fairly labor intensive, although it is certainly easier than it was in 1996. Once, the assets arrived in VHS format. Nowadays, more often than not, a program or film is uploaded to an FTP site, and downloaded onto a server.

Essentially AD is about writing a script. The person doing that job will access the server and, using software that allows for the keying in of in and out times, map out a description. Using film scripts, IMDB and other internet resources, the script is written. It is then checked for accuracy, style and coherence and will often also go to the distributor for review, and possibly further additions or recommendations. This is BTI Studios' approach. AD is not a strongly developed industry and not all providers are this thorough.

Once a script has been approved, it is recorded using in-house software, by a voice talent. The recording is then checked again and sent to the master control room to be laid back, or mixed depending on the requirement.

However, the recording is increasingly not supplied by a human speaker. There have been some impressive developments in this area, driven by technological advances that can benefit broadcasters dealing with squeezed budgets.

There are now two versions of AD: one delivered by a human and a newer version, called synthesized AD. The advances in the

latter are quite extraordinary. Yes, synthesized speech is easily identifiable as such: it's slightly robotic and not as nuanced as human speech, but many of the companies that have sprung up to meet the demand for synthesized speech are refining the process and offering genuine variety and subtlety of accents and delivery.

Thus, due to a mix of legislation and broadcast initiatives, AD is now a fact of broadcasting life. However, there is still a way to go with education and awareness when it comes to the AD process.

For example, soap operas that probably don't need much audio description may get an AD track, while complex or multi-layered dramas, whose visually impaired audience might be grateful for verbal support, may not.

Script quality varies. Of course there are bound to be subtle differences, specific to a language or nationality, which should be accommodated. U.K. and U.S. audio description scripts are not the same; this is even more the case for Italian, Hindi, Polish or Japanese audio description. Ideally, Americans should script for the U.S., Italians for Italy and Japanese for Japan. However, at the moment, the U.K. is a leader in AD so at BTI Studios we find it is often more efficient to ask translators to work from one approved English script. As more nationalities embrace best practice for AD, however, this should change.

Meanwhile the technology driving AD is continuing to evolve. The UK charity the Royal National Institute for the Blind (RNIB) and MovieReading, which supplies subtitling apps for hearing-impaired filmgoers, have harnessed new technologies to create an app that allows visually impaired audiences to play an AD track through their phones. The MovieReading app 'listens' to the soundtrack of a film through a smartphone or tablet's microphone. It then identifies the exact point in the film or TV program to sync the downloaded AD track.

All of this is technologically impressive. But what does access to AD mean to a member of the target audience? AD really enhanced the viewing experience for Stacy Rowe. She says: "As someone who is blind, I have often felt excluded from forms of entertainment that most people take for granted. Through audio description I am now able to follow story lines, identify characters, and immerse myself in spectacular scenery. Audio description gives color and character and allows me to fully enjoy the movie of my choice!"

Of course, audio description was driven by legislation, rather than markets. It is not a profit-making exercise. Nevertheless, it serves a real need that won't be going away soon, will build brand loyalty among visually impaired viewers and is a valuable demonstration of good corporate social responsibility. Meanwhile AD users, and of course charities like RNIB, continue to campaign for AD to be included throughout the distribution chain so that AD is added to video on demand and home video as well as theatrical platforms.

Service quality and audience requirements should be the drivers of AD, but more clearly defined regulations are equally important in guiding and supporting broadcasters who wish to understand their obligations. There are encouraging signs. New regulations have come in for AD provision in the U.S. VOD providers are catching on and providing AD on their services. Increasingly AD is being provided in other countries—BTI is producing AD in eight languages. Our AD department continues to grow and technology will continue to support and enhance AD provision.

However, there may be still an argument for a basic set of agreed international standards and processes that could ensure quality but also encourage efficiencies and innovation. And a bit more collaboration with the people who use the service would also be welcome. ■



Veronika Hyks was instrumental in creating the guidelines for audio description almost 20 years ago. She is a highly respected broadcaster, voiceover artist, producer, presenter and actress.

“Obsequium in Cinematographico”

(Compliance in Cinema)

By Joel Sloss, Senior Program Manager, Microsoft Azure Security,
Privacy, and Compliance

Abstract: Moving content production into the cloud is not trivial. Your workflows involve partners, artists, services, software vendors, corporate IT, producers... and yes, regulators. At first blush, it would seem impossible, and the problems insurmountable.

That’s where the partnership with your cloud provider comes in, because everything meets there: storage, editorial, metadata, rendering, distribution, content management, contracts and security. Join us as we explore why and how you can take advantage of this fundamental change to the film-making process by using the cloud for media services, VFX, and secure production workflows.

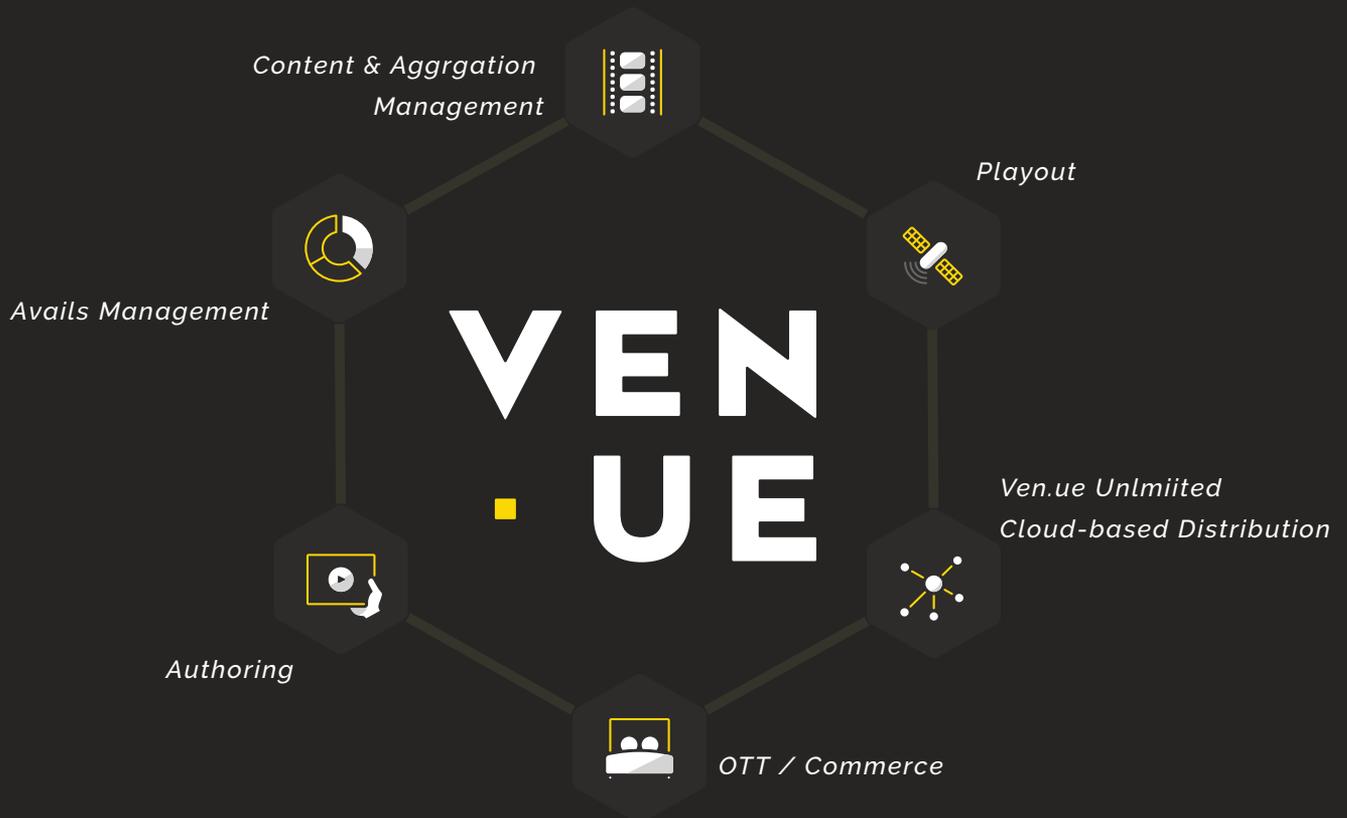
If an authentic Picasso was stolen off your wall, would you care? If you had hand-restored a classic car from the frame up and a tree fell on it, would you be unfazed? Most people who invest heavily in something, whether it be financial or sweat-equity, feel a bit put out when something happens to it, and typically try to take steps to ensure they are protected from such eventualities.

But the artistry that goes into making original theatrical or television content is rarely afforded the same consideration. In fact, some of the very same people working on the development of those assets will proactively circumvent the protections designed to safeguard their efforts. Why is this so? Why do we seemingly not care when content is stolen, pirated, leaked, or otherwise ex-filtrated? It shouldn’t be considered the cost of doing business when it is in fact altogether avoidable.

Fade-in: the landscape

Too often, security is considered an impediment to freedom and simplicity. When the implementation is heavy-handed and arduous, users will invent their own workarounds—plain passwords, avoiding encryption or file permissions, even working outside of established systems (e.g., thumb drives, unsanctioned software or rogue servers). But when security is embedded and transparent, it becomes an enabler of collaboration and can even streamline processes to everyone’s benefit.

The problem is that this is hard to do. If you’re deploying and configuring



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your own IT platform, it is probable that you won't have all of the budget, expertise, training or resources to enact every critical industry best practice. As a result, the risks in your environment increase, the likelihood of leaks increase, and your shareholder-value takes a dive.

Prolog: source

Imagine sitting in a theater at the height of current tech-perfection: 8K, stereoscopic 3D, HDR, 240fps with immersive audio, and maybe three-screen projection for good measure. Now consider the massive amount of data behind that scene—1TB per minute? Forget, for the moment, the hardware needed to present such a spectacle, and search the internet for workstations and storage big enough to process, edit, and encode a file that is larger than the Library of Congress.

Want some "special effects" shots with that? The cost of creating and managing such content on-premises will become insurmountable for most studios and production facilities, but you know it's coming. Consumer's insatiable appetite for bigger, better, and brighter experiences will only increase over time.

Act 1: film cans

So your internet sleuthing turned up a few options, ranging from renting IT crates, to application hosting, to the cloud. Renting a literal "datacenter in a box" is cost-prohibitive, as is building your own, and application hosting only fills a portion of the key gaps. Cloud provides economy of scale, pay-as-you-go capacity, and access to tools you wouldn't otherwise have. Cloud gives you flexibility and control like your own datacenter, combined with the selection of solutions available from commercial hosters. Win/win, right?

Once upon a time I learned how to thread a commercial projector. I wasn't the projectionist (union job), but I did have to hoist the giant metal cans holding the film reels up the stairs. Were someone able to circumvent a myriad of physical security mechanisms in place and run-off with one of those incredibly

cumbersome cans, they would have possessed a perfect copy of a full theatrical release. Today, no such herculean physical effort would be required, since a whole digital mezzanine file will easily fit onto a pocket-sized USB device.

Even in the days of film and clunky metal cans, there were certainly opportunities for theft to occur, however there were still some technical blockers to illegal distribution (the ability to process film, for example). The advent of digital media meant that anybody with a compatible deck could view and copy the content. When it all became computerized, files could be e-mailed, downloaded over FTP, or copied from hard-drives. Improvements to production speed and other efficiencies have been accompanied by the barrier to piracy being cut to almost nothing at all.

Act 2A: be practical

2001: A Space Odyssey was arguably one of the first great spectacles of cinematic special effects, which paved the way for decades' worth of filmmakers to come. Cameras lovingly caressed the hull of the Discovery as part of a long list of practical gags committed to film and composited in the lab, and theft of visual assets would have been fairly constrained to the prop department. In most of today's SFX extravaganzas, however, there's not a drop of fixer fluid to be found.

At first, CGI was the domain of HP mini-computers, then Silicon Graphics workstations, then desktop PCs, and now farms of servers. 3D models are coveted and sensitive intellectual property: when a feature film such as 2016's *The Jungle Book* is built almost entirely out of VFX shots that take thousands of hours to compute, the value of each scene's digital footprint becomes a major production cost item.

The development effort, render time, and custom software components are all vulnerable to breach and exploit, which could cost the studio tens, if not hundreds, of thousands of dollars to recover. Early leaks of 3D models on effects-heavy blockbusters can also result in plot spoilers from character details, or even to counterfeit products flooding the market prior to a scheduled release.

Act 2B: put it on ice

A thousand years from now, the salt caverns beneath Kansas's rolling grain fields will still be there. However, much like the scrolls of Alexandria, whatever is in them will have likely long since turned to dust (or mush, depending on global sea levels). Aging film assets grow more and more unusable every day. Magnetic tape and disks degauss or decay over time, rendering data unrecoverable. Even optical discs are projected to last only about 100 years before the laminated metal film oxidizes and becomes unreadable. Technologies change too, and when the time comes to go back and read that old media, you may not have a player capable of doing so.

So, while it's possible the next generation of archival storage will be DNA clusters encoded by altering the spin of Hawking black holes (what will people think of same-day video release when you can just inject a movie to watch it?), there is a clear and present danger with current mechanisms. The day is coming when you'll have to decide how and where to transfer your data.

Intermission

This is all pretty bleak. There will be exabytes of data (FWIW, 1 human brain = 2.5 petabytes of data, give or take), and not just moving pictures—everything that goes into content production must be stored and managed somewhere: photographs, sounds, music, models, scripts, contracts, call sheets, memos, email, and so on. It all should be retrievable, indexable, sortable, and available for processing, packaging, distribution, and reuse. It also needs to be protected from breach and exploit, accidental deletion, and corruption.

IT staff, as usual, are overburdened as it is by day-to-day tasks, complicated by bring-your-own-device measures aimed at simplifying users' lives. Yet they are expected to launch a production environment on a shoestring budget, with little support, and at a moment's notice. Naturally, security takes a back seat to the driving need of just getting up and running.

But we still need to protect our content, even if those systems never get connected to the internet.

Act 3: the plot thickens

With expectations high, we plod forward into the digital age, "ROI" ringing throughout the hallowed halls of executive suites; nobody

Continued on page 111



While at Microsoft, Joel Sloss has managed product lines ranging from BackOffice to ISA Server, mobile services, and—most recently—compliance initiatives in the Azure engineering team. Also during this time, Sloss wrote numerous whitepapers on security and compliance topics. His focus now is on the Digital M&E industry, its compliance objectives, and privacy needs in the public cloud. Joel also represents Microsoft on the CDSA Board of Directors.



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A Cloud-Based Digital Supply Chain: Not Just About Capacity

Preventing standardization from stifling innovation
By Andy Shenkler, EVP Chief Solutions & Technology Officer,
Sony DADC New Media Solutions

Abstract: There is a view across the industry that seems to be taking hold: end-to-end standards need to be mandated in order to reduce complexity and make things more predictable. We have established that standardization on the backend is beneficial, however, does it foster a sufficient amount of innovation and the competitive spirit required to deliver an experience that is uniquely valuable to our consumers? As technology continues to expand and the power of the cloud becomes a larger reality, the media industry will need to reassess that strategy, pushing the limits of technology and leveraging what cloud-based solutions can provide.

The list of options in today's world is seemingly endless with tools such as social sharing, instantaneous commenting, photo filters, unique storytelling, augmented reality, virtual reality, 3D, 4K, 8K, HDR, 7.1, 9.1, and 12.1. With access to so many opportunities, the barrier for creating a unique proposition is lower than ever, allowing almost any company to create niche offerings and to attract a consumer's attention. The hardest part, of course, is getting the consumers to know about it, try it, and, most importantly, adopt it for the long run. In the world of Hollywood mashup stories, everyone wants to be able to tell the easy elevator pitch, like *Die Hard* meets *Airplane*. Unfortunately, people believe that it is too difficult to make content readily available for all these progressive experiences. This has been especially challenging when the content is needed in any variety of combinations that would lend itself to be used in these

untried methods. Too often, it can become so overwhelming that it may make one seek a simplified mechanism to distribute all of the required content to everyone who wants to use it.

Determining the value of standardization

Standardization on the backend can be beneficial, but does it really foster the right amount of innovation and competitive spirit? Often times, not conforming to standards is required to deliver something so uniquely valuable that we, as consumers of content, don't miss out. There is a view that seems to be taking hold across the industry that end-to-end standards need to be mandated in order to reduce complexity and make things more predictable. Effectively, these viewpoints express that the supply chain provides no differentiation to the consumer service, but rather that the user experience

What if there is a need to provide an experience that is meant to try and disrupt that market leader?

and content alone should provide that point of differentiation.

That view is often articulated by existing market leaders who require the supply chain to provide content in a way that is most efficient for one particular set of needs. What if there is a need to provide an experience that is meant to try and disrupt that market leader? How could that possibly be done if the supply chain was made to fulfill the least common denominator, especially if the requirements that were used were driven by the exact organizations one was looking to compete with or disrupt? The same question should be addressed from rights holders, who, for all intents and purposes, are looking to cost effectively get their content in front of as many people

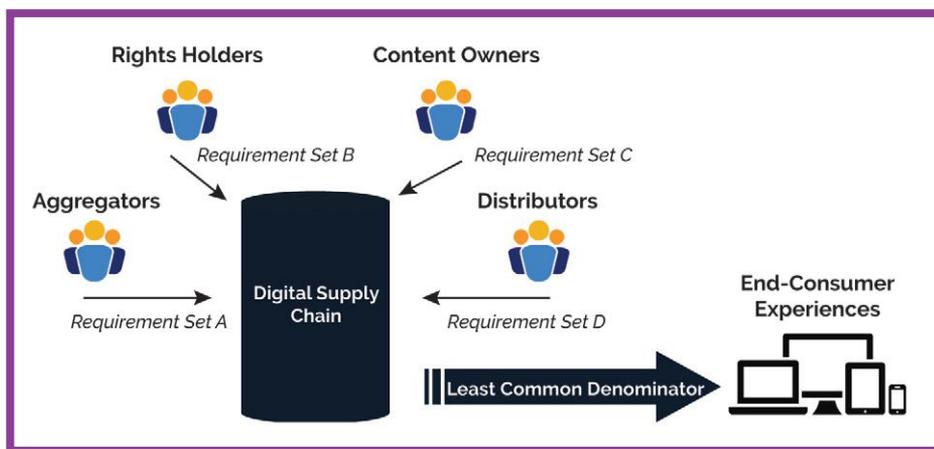
Over the last twenty years, there have been numerous incarnations of digital distribution systems imagined, realized, torn-down, re-imagined and built again. As with all things, one's understanding of how we arrived at where we are today has much to do with one's own perspectives, and how one got involved in the first place. It's certainly not to say that the individuals who started building early solutions didn't have a clear vision of the ideal end state. Most of the time, it was the age-old problem of limitations, such as money, time, and technology, that interfered; fortunately, inadequate technology is no longer a problem that which we face.

Some of the earlier digital deliverables for broadcasters were in the form of MPEG-TS

their highest digital source asset. The idea of storing an uncompressed source, or a source of any higher quality from which to create these assets, was obviously considered, but storage costs were high and transcoding was slow. When the measure of success was "it's faster and cheaper to ship a tape," you make compromises that allow you to move a transformative initiative forward.

Fast forward slightly to iTunes requiring all content owners to provide their video components in the Apple ProRes format. At first, this was met with resistance from some due to the fact that they would need to start over and re-encode, from tape source, their content. Over time, the format conversion eventually won out, and catalogs started to be re-encoded making ProRes another, yet again higher, resolution video source component. The next format that started to make headway around this same time was JPEG 2000 (J2K), which has been adopted by SMPTE as the basis for the App 2 and 2e versions of the Interoperable Media Format (IMF). The IMF is meant to be the long sought after "be-all, end-all" to allow all versions of content to exist in a single definable package, by which any edit of media can be derived. Once again, many companies are undertaking this encoding exercise to store their assets in what they hope will be the final incarnation of an expensive effort they have done so many times before.

Standards Based on Legacy Technological Limitations



Are we sacrificing innovative experiences by enforcing a subset of standards?

as possible. The media industry has the benefit of being among the first industries to push the limits of technology for the masses and watch in real-time as people respond. At times, it would appear as if consumption desires are at conflict with our backend strategies.

formats, often 80Mb/s for HD and 50Mb/s for SD. Since MPEG was the most prevalent asset type requested, many companies spent small fortunes encoding their content in this format because it would make it easily available for reuse. This would then become

Seeking consistency in components, workflows

As we moved forward towards present day, video tended to be the components that were most discussed since they held the core value to consumers. However, for everyone involved, it quickly became clear that ancillary components, artwork, text, audio tracks, and metadata were an even bigger problem in most cases. To this day, there are still companies that will deliver video independently from the other assets that are required to complete a transaction. Often times an organization will require the recipients to go to a portal to download artwork, or will send an Excel file with title avails information, and



Andy Shenkler since 2009 has been responsible for the design, development and execution of Sony's worldwide video supply chain services, overseeing and setting the global operations, technology and business strategy for NMS covering all aspects of the content lifecycle from content creation through direct-to-consumer offerings. He has over 18 years' experience leading global operations and technology organizations.

Building a future-proofed supply chain that allows all parties in the ecosystem to get what they need, without having to abide by rules that may have come from their competitors, is important for the growth of our industry as a whole.

possibly will even send an email with attachments. Anyone who thinks only the video aspect of this process is complicated doesn't understand the half of it.

It's no wonder that so many called for a streamlined, predictable and standardized workflow to be implemented. A single definable package of information that can be used to exchange rules, descriptions, content types, or anything else that is required as necessary. It all seemed like a great idea, especially when everything was costly, slow and complicated. As we reach a point in time where delivering on that goal of standardization is so close, we now have the benefit of seemingly infinite capacity on demand at incredible commoditized pricing. Yes – cloud computing.

Since digital distribution first came on the scene, everyone has either seen or used a variation of the slogan, "any format, anytime, any place." So if that is truly the ultimate goal, then how does delivering the same thing to every company, in the same format, achieve that ideal end state?

There is no question that standardization of source components is a critical undertaking that content owners should address. The IMF format begins to address a significant piece of that puzzle. The aspects of augmented and virtual reality will undoubtedly

present new challenges that need to be contemplated for those source containers. The ancillary materials are just as important.

Every offering wants to create an experience for the consumer that makes their proposition unique; whether it's descriptive information that exists only on their destination, or artwork that takes its shape, not from the traditional square/rectangle but from a creative design. Imagine an augmented reality experience whereby the consumer looks out amongst the world only to see objects from their favorite movie or TV show appear before them, which then end up being selectable components to add to inventory or to choose to preview other video experiences. With the recent success of *Pokémon Go*, that's certainly not as impractical as perhaps many thought. As standards like the Entertainment Merchant Association (EMA) spec are driving supply chains to deliver a common set of components in a common set of formats, it requires that everyone adopt a particular set of ways of accepting those elements. At the speed that innovation is progressing, it seems undesirable that we should either want or require this level of conformity when the ability to deliver against customized needs is now so easily accommodated

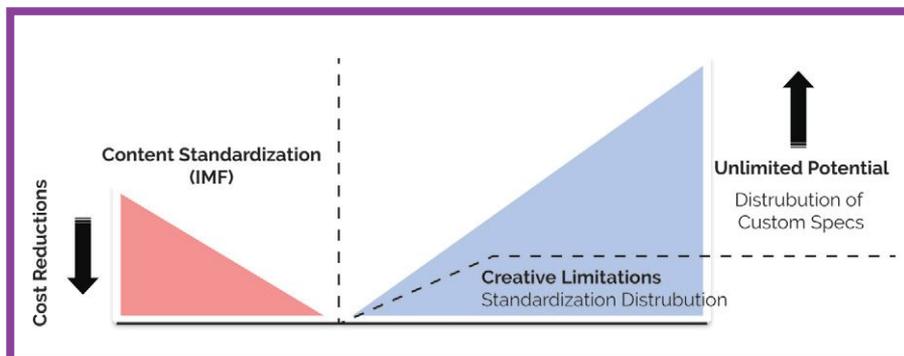
through leveraging the power of the cloud.

While the aspect of a many-to-many supply chain has been seen as an obstacle in the past, that viewpoint is rapidly dissipating. You don't have to look beyond the physical world to see the impact of how a uniquely provisioned supply chain can benefit an organization. For instance, Amazon's physical supply chain is incredibly powerful and progressive. The innovative way it chose to store goods by using space allocation as opposed to traditional clustering methods has proven to be unique and advantageous. Simply using the power of its supply chain has made it an innovative powerhouse, with no signs of stagnating in the near future. In much the same way, leveraging the power to create anything required for digital distribution points should only be limited around legal usage and not legacy distribution philosophies.

Building a future-proofed supply chain that allows all parties in the ecosystem to get what they need, without having to abide by rules that may have come from their competitors, is important for the growth of our industry as a whole. It's not to say that standards such as the EMA aren't valuable, as they should exist for those who wish to use them. However, must they be required when the ability to cost effectively create everything from anything is now finally possible? Every day the ability to transform and deliver upon the more complex requirements becomes easier to achieve.

If your digital supply chain relies heavily on an organization that is predominantly made up of people who are taking orders and operating computers like they are heavy machinery and isn't primarily comprised of software developers, then at some point soon, you will realize that you are nowhere close to being able to keep pace with the imagination of your customers. Thus, once again, this will force everyone to rethink their approach on supplying digital content in a world that is, fortunately, constantly evolving. ■

Limiting Opportunities by Embracing Outdated Methodologies



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Cloud-Powered Collaboration in the Digital Supply Chain

The digital transition and global growth lead to closer collaboration on localization

By Stuart Green, CEO, Zoo Digital



Abstract: In the supply chain, the transition from physical to digital and the global growth in developing markets have led to significant economic changes. M&E companies now face a landscape highly fragmented by distribution formats and online retailers. In an increasingly cost-conscious industry, studios must do more with less while maintaining high quality and robust security. The relationship between studios and vendors including subtitling, dubbing and captioning providers has in the past been quite loosely coupled. The requirement of service vendors is changing, however, with cloud computing playing a pivotal role in enabling parties throughout the M&E industry to meet the challenges of the digital supply chain.

In 2006 sales of DVDs peaked, online video retail amounted to renting or selling DVDs through a website, and the concept of ‘cloud computing’ was first mooted. According to forecasts by PwC, 2016 will be the year in which electronic home video revenue will exceed that of physical products such as DVD and Blu-ray. Online retailers now stream video to almost every country in the world and the cloud is hailed as the future of enterprise computing. In ten short years, digital technologies have brought about profound structural change across the entire M&E industry.

The two primary causes of change to the digital supply chain have been the transition from physical to digital screen entertainment, and the global growth in developing markets.

Where ten years ago DVD was the dominant distribution format measured both in consumer transactions as well as products created, M&E companies now face a landscape highly fragmented by distribution formats and online retailers.

By integrating its management information systems with those of its vendors, an online retailer has the means to push orders and source materials to suppliers in real-time and receive back quality controlled deliverables directly into their asset management systems.

The need to do more with less

While international box office accounted for 71 percent of theatrical sales in 2015, up from 64 percent in 2006, the worldwide expansion of home entertainment has grown at a far greater rate due to the ease with which online retailers can now enter new countries. The multiple audio and subtitle streams supported by DVD triggered an initial expansion of the localization market that eventually became constrained by the number of languages that could fit on a single disc. In contrast, in the new era of digital distribution, TV and movie content can be delivered efficiently and cost-effectively to pretty much any country in the world. Indeed, in 2016 online retailers have launched truly global services, simultaneously bringing internet TV networks to more than 190 countries.

For content owners, this transition has brought considerable challenges: despite shrinking budgets, titles must be localized extensively and delivered through a growing number of distribution channels over shortened release windows. In this increasingly cost-conscious industry, studios must do more with less while maintaining high quality and robust security.

The outsourcing of post-production and services such as subtitling, dubbing and captioning services by film studios is a well-established practice that has continued through the digitization of the motion picture industry. Leading vendors that once offered predominantly celluloid-based services now operate in an end-to-end digital supply chain, yet the systems, business model and fundamental mindset of many vendors remains largely unchanged. For outsourced services that don't require directorial oversight, such as localization and DVD/Blu-ray authoring, vendors have traditionally operated opaquely – studios supply work orders in the form of emails, spreadsheets and file transfers, and vendors fulfil

the services and digitally transfer the results back to the client.

A straightforward way to work, this loose coupling of studios and vendors has served the industry well for decades, not least because it allows commoditization of services: working with multiple vendors enables studios to reduce risk and drive down prices. However, in the new digital supply chain in which management decisions over territory releases, localization strategies and distribution channels are made in a fraction of the time they once were, the traditional engagement model is no longer tenable. There's a limit to which such vendors can lower costs while maintaining high standards of quality.

Closer collaboration in the cloud

A shift is becoming increasingly evident as studios begin to recognize that new ways of working with vendors are needed to keep up with the pace of change. Judging by the questions that are now frequently asked in 'Request for Proposals' (RFP) documents prepared by strategic sourcing departments, it's clear that studios now expect new technologies to play a greater role in the studio/vendor relationship. Questions such as "What investments has your company made to utilize technology systems to optimize the costs, quality and delivery associated with the services?" and others like it have become commonplace in RFP documents and important considerations for vendor selection.

While managing workflow by spreadsheet has long been commonplace, this is now widely regarded as a point of vulnerability with the risk of human error and the difficulty of version control to keep multiple copies of the same information synchronized across teams and organizations. Progressive M&E businesses are looking to link information systems with

their partners, made possible by Application Programming Interfaces (APIs). This is particularly true of several leading online retailers: global publishers of large catalogs of localized content. By integrating its management information systems with those of its vendors, an online retailer has the means to push orders and source materials to suppliers in real-time and receive back quality controlled deliverables directly into their asset management systems. This is a highly streamlined, efficient and auditable way of working that benefits from automated reporting of KPIs for metrics such as quality and on-time delivery, so that suppliers can be compared objectively.

Studios, too, have begun to take steps to support more effective and agile working practices by providing their vendors with logins to internal work order systems. The availability of an API for such systems is becoming more common, giving vendors the option of a tightly integrated interface with clients.

These trends towards integration and shared use of information systems point to a transition of working relationships away from the traditional client-supplier model to those that are far more collaborative, in which a vendor's project team members are increasingly distributed across multiple organizations. The multiple source approach to services remains a key requirement for many studios, and therefore information systems must be vendor-neutral – software that effectively locks a studio into working exclusively with one vendor is unlikely to be tenable. Vendors must be far more agile and scalable than ever before, offering transparent and fair pricing and full visibility of accurate project information to support quick and efficient decision-making by clients. This, in turn, will often lead to a rethink of the systems and ecosystems that surround particular service lines.

As an example, localization has traditionally been provided by pure service organizations in which in-house translators work on licensed off-the-shelf workstation software, often supple-

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With a PhD in Computer Science, Stuart Green brings a technological perspective to the leadership of the company. Responsible for ZOO's intellectual property portfolio of over 30 patents in image and media processing, he oversees corporate strategy and research partnerships with leading academic institutions and other industry partners.

Leveraging the Cloud to Digitize and Transform the Entertainment Production Lifecycle

New technologies can enable stunning changes in the way support functions are carried out across entertainment production finance

By Alex Godelman, SVP and CTO, Cast & Crew Entertainment Services



Abstract: To consumers, the entertainment industry – film, television, commercials, events and games – has achieved remarkable technological achievements over the past decade. Behind the scenes, however—or more accurately, in many of the support functions carried out by external specialists—the story is very different. It's true that post-production is significantly ahead digitally, but pre-production and production tasks have continued to operate in a dated, paper-intensive processing world. Digital enhancements are being powered to great benefit by cloud technology.

Consider: Countless moving pieces characterize the kick-off of a new production. Imagine onboarding 500 to 1,000 crew members. After a job offer is formally made to the employee, large piles of start paperwork need to be filled out by the worker and then sent off into a maze of approvals before landing at the payroll company for processing. This all assumes the paperwork was properly filled out by the employee who more often than not writes in his or her own title and rates.

It is no wonder that most Production Assistants (PAs) appear to be so overwhelmed.

Inconvenience isn't the only problem. Not fully knowing or understanding your employer can be another issue.

Almost a decade ago, IDC published a white paper asserting that U.S. and U.K. employees cost businesses \$37 billion annually because they do not fully understand company policies, business processes, job function or a combination of the three. Moreover, the paper noted, by ignoring the issue, companies put themselves at risk for compliance, public safety and legal problems.

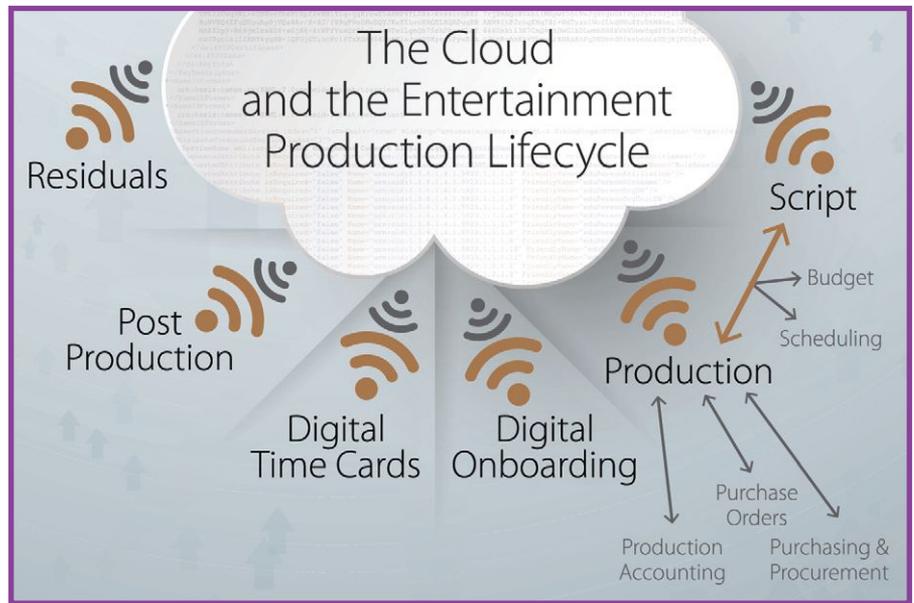
While these existing paper-focused practices may have all the hallmarks of a hamster getting nowhere fast, they nonetheless have been the reality of the industry for decades and decades.

Now, however, the industry is driving digital enhancements – and advanced solution delivery – that are being empowered by cloud technology. These new technologies not only represent stunning changes in the way support functions are carried out across the entertainment production finance lifecycle, they are creating additional business value for studios, production companies and independents alike. And there's more to come.

“Although cloud is widely recognized as a technology game changer, its potential for driving business innovation remains virtually untapped,” write Saul Berman, Lynn Kesterson-Townes, Anthony Marshall and Rohini Srivathsa in *The Power of Cloud* from the IBM Institute for Business Value. “Indeed, cloud has the power to fundamentally shift competitive landscapes by providing a new platform for creating and delivering business value.”

In the entertainment industry, this fundamental shift is manifesting itself in intriguing solution-focused partnerships between traditional paper-heavy companies such as payroll processors and the studios themselves. In the process, the previously low- and no-tech processing companies are transforming themselves into technology companies reinventing an industry.

Powered (and empowered) by the cloud and software tool kits (STKs), they are overlaying



Cloud technologies can enable stunning changes in a range of production support functions.

the traditional production lifecycle with new tools that deliver a multiplicity of new features and advantages, including:

- **Greater speed and agility**
- **Improved flexibility, scalability and mobility**
- **“Pay-as-needed” capability and capacity**
- **Security**
- **Quicker-to-market characteristics**
- **Greater adaptability**
- **Economies of scale**
- **Economic savings from the elimination of data center maintenance and reduced downtime**
- **Immediate global deployment**

Disruptive digital technology

To be sure, cloud-based technology can impact companies and deliver value in multiple ways. While the IBM team notes three—optimization, innovation and disruption—current advancements in the entertainment production lifecycle clearly are focused on the latter: disruption.

To understand the phenomenon, it is essen-

tial to get past the notion that disruption, by necessity, must be correlated with widespread negative experiences. What we know—and what a growing percentage of people have come to learn over the past decade or so—is that the negative aspects of disruption are limited to a small group (incumbent businesses and customers and support organizations) and not the wider group of stakeholders.

“A disruptive technology flies under the radar, opening new markets, products, and services at returns that are initially unattractive to the incumbents,” writes Alex Krikos, Principal at Technology Management Services. “In a disruptive framework, cloud computing offers greater scalability, utility-based pricing, and ubiquity among applications, consumers, and potentially among cloud computing vendors.”

One problem, of course, is that companies sometimes can be their own worst enemies.

“Innovation fails because organizations unwittingly strip the disruptive potential from new ideas before they even see the light of day,” writes Clayton Christensen, who first coined the term “disruptive technology” decades ago,



Alex Godelman joined Cast & Crew in January 2016 with a strong engineering and product-development background, as well as a track record of success delivering web-based products and services. He was awarded the 2010 CTO Rock Star Award from the Los Angeles chapter of TechExecs and is certified in Lean and Scrum. Prior to joining Cast & Crew, Godelman was SVP CTO at Sony New Media Solutions in New York, and CTO at Evolve Media.

Cloud technology is facilitating the development and implementation of powerful and transformative digital solutions in critical areas, including onboarding, time cards, scheduling, budgeting, asset management and multiple post-production tasks, including residuals.

in *The Innovator's Solution*.

But, with disruption as the goal, cloud-based solutions are turning this particular industry on its head.

An industry facelift

Cloud-based services will deliver an entirely new experience for entertainment companies and the crews they employ as the new digital world is simpler, faster, more powerful and more efficient. In many cases, service providers (i.e., the companies providing payroll and residuals processing, workers' compensation insurance and other services) are working hand-in-hand with clients to develop a more-productive and flexible way for companies to manage these critical functions.

Asset-light, highly mobile and flexible, cloud technology enables disruptive new approaches that leverage current technologies and platforms with the intent to eliminate the obstacles that formerly created issues for users.

For the entertainment industry, cloud technology is facilitating the development and implementation of powerful and transformative digital solutions in multiple critical areas, including onboarding, time cards, scheduling, budgeting, asset management and multiple post-production tasks, including residuals.

In the critical area of employee on-boarding and start paperwork, for instance, digitization not only shifts on-boarding to digital from paper forms, it enables efficient crew starts for any type of project, provides flexible and customizable approval flows and gives producers immediate visibility into on-board data.

Likewise, electronic time cards not only are the important front end to much-desired hours-to-gross (HTG) advancements, they also open new channels for employees to input and approve time worked and foster efficiency and accuracy

Asset management provides countless interesting possibilities, made possible in large part

from the metadata found in screenwriting software. The metadata in the script open the door to a seamless production purchasing system—a virtual warehouse for tracking production assets from purchase through production, and beyond.

The car, the evening gown, the suit of armor ... whatever. The metadata tells you how much it cost, from whom you acquired it, what scenes it appeared in (and what time and what day) and where it was shipped after you wrapped. Production departments can easily tag costumes, props and equipment on their smart phones with integrated QR and barcode tracking. And crew can attach asset QR codes, snapshots and locations into script breakdowns, schedules and invoices.

Moving forward

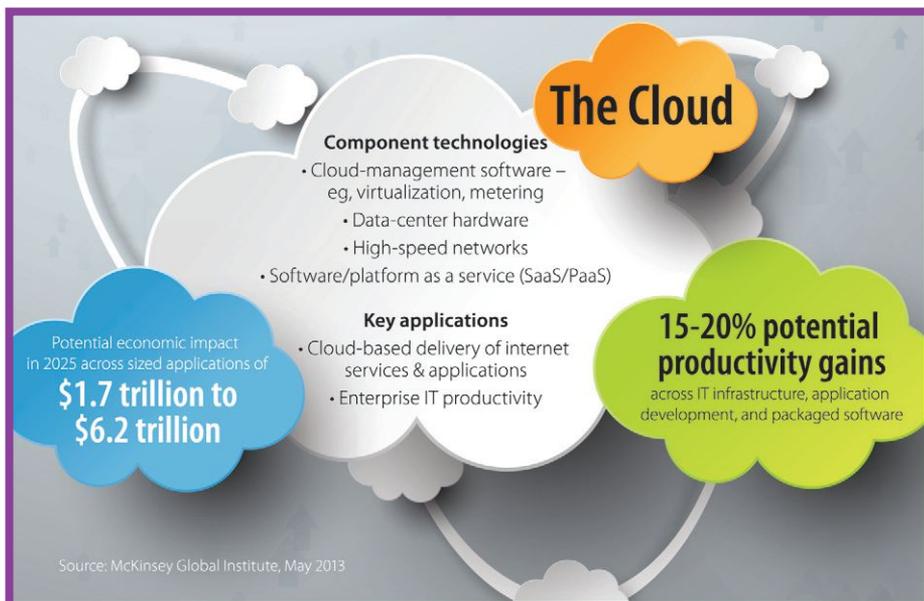
The immediate changes in the industry are clearly understood. On-boarding, timecards, scheduling, budgeting – even asset management – have been areas of interest for years. Adoption, therefore, will be widespread and both providers and users of the new digital tools will have a shared understanding of the value of these new cloud-enabled services.

As we move forward, however, the possibilities are endless and data and information will be the consistent themes. From a business-management standpoint, approaches to security, disaster recovery and data storage will all be viewed from a new perspective.

The task of managing entertainment production will change markedly as both financial and creative types will be able to tap into the big data and get answers to specific inquiries about costs that will help in building budgets and schedules. “What-ifs” can be answered and potential scenarios can be built.

“Cloud computing is rapidly entering an entirely new phase – one destined to prove far more transformative and disruptive than the initial phase of cloud deployment,” writes Sean Hackett of 451 Research. “Cloud is driving a comprehensive transformation of digital assets in organizations of all stripes.” ■

The Cloud: Use of the computer hardware and software resources to deliver services over the internet or network



Cloud technologies also can create additional business value for studios, production companies.

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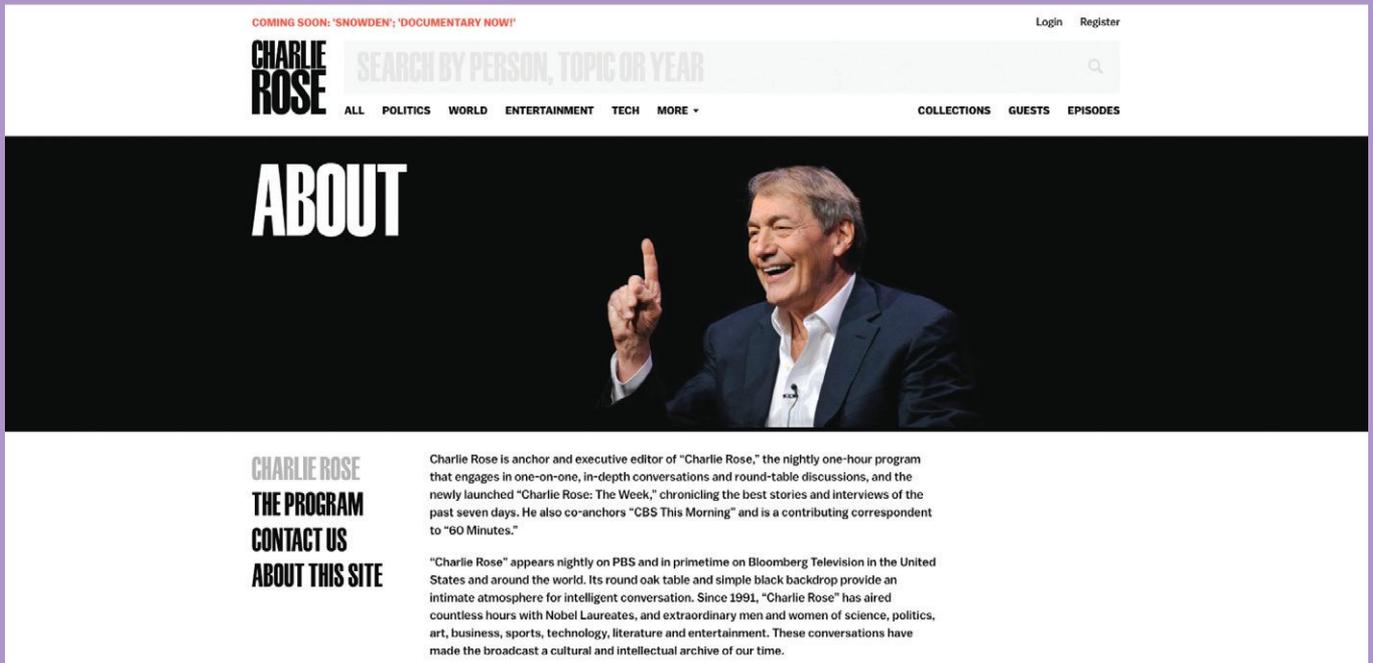
More engagement

Get closer to audiences, employees, and mobile workers with social and productivity solutions.

Unlock the Power of Your Archive With Cloud-Based Asset Management

Charlie Rose demonstrates how media companies can manage a physical archive, a digital archive and new content

By Andy Hurt, SVP Marketing and Business Development, Wazee Digital



CharlieRose.com is a portal that features the entire history of the “Charlie Rose” show, including many iconic interviews, which are searchable.

Abstract: The days of content being dormant and sitting behind the firewall in an archive are dead.

Now, it is all about monetizing content and making it searchable, discoverable, and shareable. This can only be achieved in a cloud-based implementation. For example: Charlie Rose. The prominent talk-show host uses a high-touch solution to migrate over 11,000 hours of interviews into a library of over 18,000 highly curated interviews.

It used to be that broadcast and cable networks commissioned or created programming, pushed it out over the air, and then sent it to an archive, rarely to be seen again. Viewers tuned in faithfully at the appointed times every day or week to watch their favorite shows, and advertisers allocated their dollars accordingly. Everyone hummed along in a happy little ecosystem. Then came over-the-top (OTT) services and video on demand (VOD), throwing that ecosystem out of balance. And the media business hasn’t been the same since.

Consumers have gotten used to watching what they want, when they want, without being constrained by a broadcaster’s schedule. Demand for instant video streaming is on the rise, forcing broadcasters to rethink their linear distribution model in order to compete. And that means rethinking the way they store and access their content.

Archives (as we know them) are dead

For many years now, the workflow has gone this way: Someone produces a show, records it onto tape, and delivers that tape to the broadcaster. The broadcaster runs the tape through its MAM and playout systems for scheduling to air, after which the tape gets archived onto a shelf in a vault, where it sits indefinitely. Meanwhile, the content that has been digitized heads to its own storage area behind a firewall, where it languishes with little hope of being repurposed or remonetized in any meaningful way.

This practice is problematic for many reasons, not the least of which is that it’s painstakingly

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Quality Control
for Film & TV

The best solutions put a company's content and associated metadata into a managed framework in the cloud, where it is accessible on a global scale but still subject to all the security measures inherent in today's cloud technology.

slow to locate a particular piece of video, if you can find it at all. For example, if you need to find broadcast-quality footage of a key moment from 10 years ago, sometimes the best hope is that someone on staff will remember where to find the tape, or at least which generation of tapes to look through. You might have to check a spreadsheet or, if you're lucky, a physical asset management database based on FileMaker or Nesbit.

The original intent of an archive was to preserve content, not to make it easily accessible. That's why all major media companies still do it this way. But this legacy workflow doesn't allow the kind of speed and flexibility needed in today's video distribution landscape, where VOD, OTT, social media, and 24-hour news applications call for immediate and easy access to a well-organized catalog of video — in both digital and broadcast quality, with the ability to accommodate any end device, from smartphones to HDTVs and beyond.

The days of content lying dormant in an archive behind a firewall are numbered. Now it's all about making it searchable, discoverable, shareable, and monetizable.

A better way to do it

Many media companies are sitting on a goldmine of intellectual property. The bigger the archive gets, the greater the opportunity. If they can't leverage that archive, then they're leaving money on the table. That's why more and more of them are looking for organized title-management as they shift from tape to digital.

The key is to employ a digitization strategy that moves the content outside of the firewall and into the cloud. Why? Because

sharing content outside the firewall means more people will be able to find it — which means more opportunities to repurpose, distribute, and monetize it. Speed of access today is extremely important, especially in the case of breaking news. For example, if a prominent person dies or does something remarkable, you want news outlets to be able to access all relevant content in your archive, because the first relevant images to show up are the ones that get the lion's share of the monetization and most of the eyeballs.

There was a time when the concept of third-party accessibility was unthinkable to media companies, but today they are looking at ways to improve their revenue streams, and one clear way is by repurposing legacy content. To make it happen, these companies are realizing that it pays to be a little less protective of their archives.

Less protective does not mean less secure. The best solutions put a company's content and associated metadata into a managed framework in the cloud, where it is accessible on a global scale but still subject to all the security measures inherent in today's cloud technology.

A cloud implementation is also a way of future-proofing an archive. Cloud-based services are continually updating their own technology, which means refresh costs are baked into the services, so media companies no longer have to worry about aging and depreciating legacy technology.

Finally, creating a repository in the cloud makes it much easier for content owners not only to make their content available to others, but to reuse that content themselves.

Case in point: Charlie Rose

One content owner who has put this media

strategy into action is Charlie Rose, journalist and host of the "Charlie Rose" television series, an interview show born in 1991 and distributed nationally by PBS since 1993. Rose is famous for interviewing the top names in politics, sports, entertainment, and business over the past 25 years, amassing more than 12,000 conversations in the process. It is a trove of rich and diverse content, with more being added all the time, and Rose wanted it to do more than sit in a vault.

To that end, Rose's staff turned to Amazon Web Services and Wazee Digital to help digitize, transcribe, organize, store, make searchable, and make distributable more than 11,000 hours of interviews. The result of that 18-month-long effort was CharlieRose.com, a portal that features the entire history of the "Charlie Rose" show, including many iconic interviews that haven't been seen since they first aired. Anyone can browse the entire archive; search for specific guests, dates, and topics; watch clips or full episodes; and read full transcripts of each show.

Rose's branding and web-development partners designed the outward-facing portal. On the back end, all master show files, ancillary documents, and associated metadata live on the Amazon Simple Storage Solution (Amazon S3) and Amazon Glacier services. Wazee Digital provides an ingest and management layer on top of the Amazon cloud storage, whereby new content is automatically ingested and directed to Amazon. Wazee Digital also enables access to transcripts and interviews and powers the underlying search experience — all of which allows portal users to find and view the interviews they want quickly.

With this service architecture, not only can Charlie Rose satisfy increasing interest in his new and archival material, but he can be more agile in leveraging this content for himself. The possibilities for brand-building and monetization are virtually endless.

For example, Rose could create a branded mobile app with access to the entire show

Continued on page 115



Andy Hurt is responsible for Wazee Digital's global marketing and business development. With more than 15 years of experience in the media and entertainment industry, he is a seasoned professional who brings vast experience in marketing, partnerships, product management, and mergers and acquisitions. Prior to joining Wazee Digital, Hurt worked in product management for Oracle, Front Porch Digital, and Level (3) Communications.

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Delivering a Showcase Entertainment Experience to Employees and Partners

The cloud improves workflow for DISH



Abstract: DISH Network is probably best known for its iconic gray discs. But in today's fast-paced provider and entertainment landscape, it is technology services leader accelerated by cloud partners. John Swieringa, EVP Operations at DISH, discusses the needs of his customers and his 18,000 DISH employees and how the cloud improves the entertainment leader's workflow.

By Chuck Fontana, VP Corporate & Business Development, Okta

When we talk about innovation in M&E, it's easy to focus on advancements in filmmaking technology and the home entertainment space. The strides the industry has made in CGI and special effects, as well as bringing personalized media experiences to anyone with a Wi-Fi connection and a mobile device are without a doubt amazing. But what isn't always talked about is the employee and partner experience.

The audience is bigger – and smarter

Gone are the days where you physically had to come to a newsroom or a studio every morning to do your work. You have editors in Bangalore collaborating with producers in Vancouver and Hong Kong. Citizen journalists in Baton Rouge, La. use Facebook Live to send reports to mobile newsrooms on the streets of Washington, D.C. Every company is expected to have streaming content available via apps. And the employees that work for these entertainment companies expect to have the same streamlined, always-on experience that the company's customers receive. Consumers and employees demand ease of use because there's so much commoditization of technology, so it's crucial to make the experience superior. And key to that is technology: making experiences customized, simple and secure.

In my experience at Okta (which helps companies like 20th Century Fox, News Corp and DISH Network securely connect their people to technology), digital media companies are no longer focusing solely on the viewer experience. That's because the model of media has completely changed: it's no longer just a small group of creatives delivering content to audiences at movie theaters. Employees, customers, partners and contractors are all trying to access and/or edit content on multiple devices. If you don't make that process simple, your company could meet the same fate as the video rental store. Even worse, if you don't keep it secure, your company's emails become front page news for an entire year. And at the same time, if your service isn't reliable or easy, you lose customers as they complain about their negative experience on social media.

The reality of a big supporting cast

The complicated landscape means that it's impossible to build all your own services from the ground up. The reality is that a company pulls together hundreds of applications and services for both its employees and customers.

So how does a company handle this new reality? We recently

spoke to Okta customer John Swieringa, Executive Vice President of Operations at DISH, to get his take.

DISH uses cloud to keep the game on

When you think of DISH Network, you probably think of their iconic gray satellite dishes. But in today's fast-paced world of media and entertainment, they are a technology services leader accelerated by cloud partners. And when it comes to bringing on technology, John prioritizes the needs of his customers and his 18,000 DISH employees: "When you are in this type of environment you have to figure out how to partner, how to work with other companies that are making investments," Swieringa said.

DISH quickly realized how the cloud could improve the entertainment leader's workflow. "The recovering finance guy in me quickly found out that we needed a sustainable and repeatable way to effectively bring these applications into our environment," Swieringa said. "Something foundational that we could rely on regardless of the customer or the use case, to be able to deliver secure computing."

DISH's satellite customers expect more from the pay-TV provider's technology than ever before. The company has integrated apps into its set-top box that deliver everything from the pay-TV provider's sports app, Game Finder, to Netflix and Pandora. It recently launched My Tech, an Uber-like application that helps customers pinpoint when their technician will arrive for their home service appointment.



In order to deliver this experience, DISH needed to provide workers the ability to access the right software and keep customer needs as the top priority. Flexibility and self-sufficiency are key to DISH's business: after all, its technicians can't sit in cubicles all day. They are out in the field, helping DISH customers.

Flexible IT teams are the foundation of business

When we talk to heads of IT and technology leaders at media companies, this pressure to deliver seamlessness and security is immense. That's why it's important for technology providers to build this mindset into IT and beyond. Every leader needs to learn that the new future is IT that's adaptive. Whatever comes next in media, whether it's augmented or virtual reality, 3D sports or movies made by AI, it's paramount that the team that supports these efforts can quickly get the show up and running smoothly. ■

The employees that work for entertainment companies expect to have the same streamlined, always-on experience that the company's customers receive.

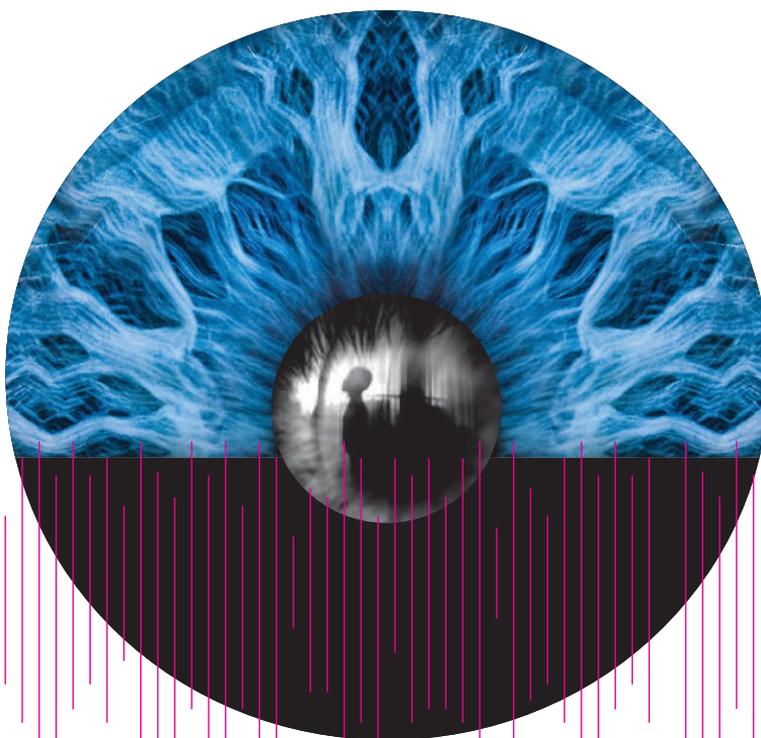


Prior to joining Okta Chuck Fontana was Director of Business Development and Product Marketing at Cisco, and a founder and executive in several startups. He is a recovering lawyer, having obtained a juris doctorate from UCLA.

Virtual Reality Analytics Mean Real World Value for Marketers

Future iterations of VR hardware will likely include eye tracking, hand tracking, and potentially more. With VR we've moved from tracking the input of devices to tracking the direct motion of people.

By Marc Jensen, Chief Innovation Officer, space150



Abstract: The motion sensing, eye-tracking and interaction information generated from viewership of Virtual Reality programming is unprecedented and will open a new world of product placement and digital ad spending rivaling the rise of the internet.

According to Deloitte, Virtual Reality (VR) will have its first \$1 billion year in 2016, with about \$700 million in hardware sales, and the remainder from content. Brands, entertainment companies and studios across the globe are devising their VR strategies. In fact, last month STX Entertainment acquired Surreal Inc., a producer and distributor of immersive content, to create a new immersive division. VR investment is very strong in the US and globally, with China standing out (Baidu, Alibaba and Tencent).

One of the most powerful, overlooked—and potentially controversial—applications of VR is the analytics behind those immersive user experiences.

First, let's set the stage. As long as video games have been around, game developers have been using feedback to improve

the gaming experience. Things started with in-person focus groups and testing, and watching how players played, where they got stuck, and how they could improve the experience. As games came online, this gameplay telemetry data (describing the collection of data over a distance) was collected and aggregated to provide feedback from many game sessions.

Modern PC, console, and mobile games can provide amazingly rich data (definitely “big data” territory) that range from player inputs, to paths through the world, to progression metrics. For competitive multiplayer games, this is critical for designing maps that deliver on gameplay goals for a specific game or level. Some games, like *Titanfall* and *Left for Dead*, use artificial intelligence (AI) controlled “directors” to steer the gameplay based on each specific gameplay session. In fact, the *Battlefield* series from Electronic Arts generates over

For entertainment marketers, the ability to understand how consumers will interpret physical spaces and how those spaces resonate will usher in a new era of design. Imagine designing a haunted house to produce an exact heart rate increase and knowing exactly where people will look and placing a zombie with precision.

1TB of telemetry data per day, while some more popular mobile games can generate over 150TB of data per day.

Virtual Reality telemetry + analytics

The emergence of VR and Augmented Reality (AR) will extend this far beyond the joysticks, keyboards, and mice of traditional gaming. Today, the HTC Vive “room-scale” VR system, one of the most popular systems, allows users to move around in a 20 x 20-foot area with a full six degrees of freedom for the headset and controllers.

Given this, the following input information is available when creating and designing experiences:

1. Player head position, orientation, and height - In addition to the position of the head and the direction they are looking, any “room scale” VR experience also knows the height of the player, because the headset is tracked in real world space.

2. Player hand position, orientation, and control inputs - this information tells us where exactly the player’s hands are, and what are they doing, and what buttons they are pressing. In addition, it can measure how fast and with what intensity those motions are taking place.

3. Finally, eye-tracking, while not widely available now, will be integrated into headsets very soon. This opens up possibilities for understanding gaze, attention and how long that view is held (focus).

The information around head movement and orientation is ultimately the key thing that VR is built on, and the feeling of presence within VR is due to this. The raw data from

these systems is often converted into higher level gestures (hand waving, for instance), but the raw data is always available to the developer of the experience. In addition to gestures, tracking where someone is looking is often a trigger to drive an experience forward. The Oculus Rift offers similar information to the developers, and future iterations of VR hardware will likely include eye tracking, hand tracking, and potentially more. With VR we’ve moved from tracking the input of devices to tracking the direct motion of people.

For media and entertainment marketers, these metrics have a number of implications and create multiple opportunities:

Better experiences

VR will only continue to expand to impact both physical and digital experiences. With heat mapping, eye-tracking and integration with biometrics like heartbeat, entertainment marketers will be able to understand how audiences are physically reacting to experiences. We can better understand where eyes are landing and how long the user’s gaze stays. With this rich information and tracking, we can create much more compelling experiences, and have the ability to track motion to amazing degrees of accuracy.

For entertainment marketers, the ability to understand how consumers will interpret physical spaces and how those spaces resonate will usher in a new era of design. Imagine designing a haunted house to produce an exact heart rate increase and knowing exactly where people will look and placing a zombie with precision. This same technique combined with real-time feedback will be used to tailor experiences for a specific individual.

Understand monetization potential

Building on that understanding of how these experiences resonate and produce reaction, ads and branded experiences can secure specific ROE, or return-on-experience. VR already showcases strong time-in-experience metrics. As such, marketers can better understand and sell the value of these experiences to brands. Right now, brands are experimenting with VR advertising as it relates to in-experience banners or branded experiences, but it’s easy to imagine a world where brands could pursue a certain emotive response to content—perfume ads that trigger those butterflies in your stomach of meeting someone new, for example.

A new interaction paradigm

VR gives us the ability to create amazingly rich and compelling branded experiences like never before. VR brings presence in a way that was just not possible before. There is incredible opportunity to incorporate and understand action to create experiences that pull users in and keep them there. Early results show that when people start a VR session, they spend a long time in a given experience, and if it’s compelling, they stay engaged. This is very different from the short “micro-moments” of mobile, and requires new and different thinking.

This is new territory and features like eye-tracking are just now being rolled out on these platforms. However, as we learned with mobile and social, the innovations will move fast here. The brands and marketers that can understand, create, test and learn will be best equipped to tap into the amazing potential of VR moving forward. All of this potential must be balanced with providing a compelling experience for users, so it’s a fair deal. Openness and transparency are key here. We are in a place where success has yet to be defined and the metrics that matter are still being sorted out, but that will soon change and it is up to us to define. ■



With more than a decade of experience leading teams and brands at space150, Marc Jensen is a noted thought leader on emerging technology topics and their impacts on brands. At space150, he has worked with a pedigreed list of brands, including 3M, American Express, Buffalo Wild Wings, and Nike. His experience in gaming, virtual reality, cloud computing, and physical-to-digital experiences have helped the agency become a national leader.



Broadcasters Should Be Talking About Non-Traditional Content

OTT data can be used by producers to develop ideas and create content that is likely to be popular based on real-world trends

By Brian Morris, VP & General Manager, Global Media and Entertainment Services, Tata Communications

Abstract: Broadcasters, content producers and hardware and software providers for the video and audio market see huge potential growth in over the top (OTT) services. According to a forecast by Mobilesquared analysts, the OTT market will grow to \$54 billion by 2017. This boom is driven by peoples' hunger to watch their favourite shows, anytime, anywhere, on any device. OTT services are enabling the future fusion of TV and digital video content, propelling the ongoing evolution of entertainment as broadcasters and producers experiment with different content types and formats.

Delivering content via OTT is referred to as non-traditional distribution and one of its many advantages is that users do not have to subscribe to a traditional cable or satellite TV provider. This technology supports on-demand and catch-up services that allow viewers to watch whatever content they want, whenever they want and on any device – including mobile. While the content travels over the network of the internet provider, the content itself is often managed and delivered by third parties such as Netflix or Amazon Instant Video.

The advantage OTT brings to the viewer is quite clear: the technology gives the viewer ultimate flexibility and also allows him to tailor the content to his needs and tastes. For broadcasters, OTT provides an opportunity to evolve the entertainment experience from watching to engaging and sharing.

For example, data from Spredfast shows that the season six premiere of *Game of Thrones* registered a huge impact on social media. *Game of Thrones* and broadcaster HBO received 829,000 mentions from Friday through to Sunday, with #GOT used 602,000 times during that timeframe. The previous weekend generated only 252,000 mentions, showing how despite living in an on-demand world, live broadcasts still have the power to mobilize viewers in a way that makes them share their experiences on social media. Exploring this dynamic between non-traditional distribution, live broadcasting and social media presents an opportunity for broadcasters and producers.



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By analyzing data concerning viewing habits and the types of shows and storylines that engage viewers the most, Netflix develops an idea of what its next blockbuster television series or film should be.

So, companies with innovative broadcasting distribution models are changing the way content reaches the consumer. Furthermore, the combination of non-traditional distribution and social media is changing the role of consumers from viewers to participants. However, OTT content delivery also presents the opportunity for broadcasters to win over new audiences with high quality content of their own making.

The concept of Netflix Originals is a great example of this. By analyzing data concerning viewing habits and the types of shows and storylines that engage viewers the most, Netflix develops an idea of what its next blockbuster television series or film should be. This approach was core in the commissioning of hit productions such as House of Cards and Daredevil.

Evolving entertainment

To take this a step further, by using data analytics and algorithms to inform content generation, non-traditional distribution models can give broadcasters the opportunity to experiment with different technologies and evolve the entertainment experience for consumers. Unconfined by the shackles of traditional analog distribution in the age of OTT broadcasting, smart televisions and immersive entertainment, what opportunities could virtual reality (VR) and augmented reality (AR) hold for the broadcast and entertainment industry?

For example, VR and AR are often associated with gaming – the explosion of *Pokémon Go* this summer is a good example of the power combining physical and virtual worlds can have on the immersive entertainment experience. Furthermore, we are already seeing virtual reality capture the interest of filmmakers; Lucasfilm partnering with Industrial Light & Magic's immersive entertainment division to make a VR movie about Darth Vader is a prime example of this. Rather than simply feeling "immersed" in the spectacle, this experience is said to take immersive entertainment a

step further by delivering a fully customizable experience in which the viewer can actively affect the outcome of aspects of the plot.

Such sophisticated uses of VR could be game-changing for the broadcast industry – potentially enabling viewers to create their very own experience of a common story line. This takes us into an area where the social media explosions at the season finale of *Game of Thrones* will not simply consist of "OMG" tweets and Facebook posts. However, users may have their own original content to share based on the individual outcome of their customized experience. Therefore, the conversation would be more along the lines of "OMG! Look at my ending. What happened in yours?"

Putting the content creator in control

Despite the on-demand culture OTT networks have helped create, shows such as *Game of Thrones* prove that recorded broadcasts can still cause fever pitch as the excitement unfolds in real-time. The same is true for live broadcasting – whether it's the headline act at Glastonbury music festival, or the final lap of the Monaco F1 Grand Prix. Non-traditional distribution gives viewers greater choice over the acts they want to watch as well as the game or individual they want to follow.

Furthermore, OTT has led and will continue to lead to a shift in power whereby content producers have more control over how their work is broadcast and shared with their fans and viewers than previously when those decisions were almost solely in the hands of broadcasters. This is advantageous for brand building and raising awareness of new music and television shows, and emerging sports and other events. For example, if we use the example of Beyoncé, one of the greatest celebrity brands of the moment, OTT broadcast

has enabled Brand Beyoncé to better control how content reaches her avid fans. Whereas earlier in her career viewers had to flock to radios and music video channels, buy CDs and DVDs or attend her concerts to hear her latest hit, they are now able to live stream her concerts, view photography before the media reveals it on Instagram and Beyoncé.com and go to her YouTube channel for her latest videos.

The benefit of this multi-channel world for celebrity brands is that having better control over the distribution of content, in turn means they have more control over the content itself. This promises to be a good thing for their fans, who will receive more customizable and personalized content as well as having the opportunity to vote for the types of content they want to receive using polls and competitions on social media.

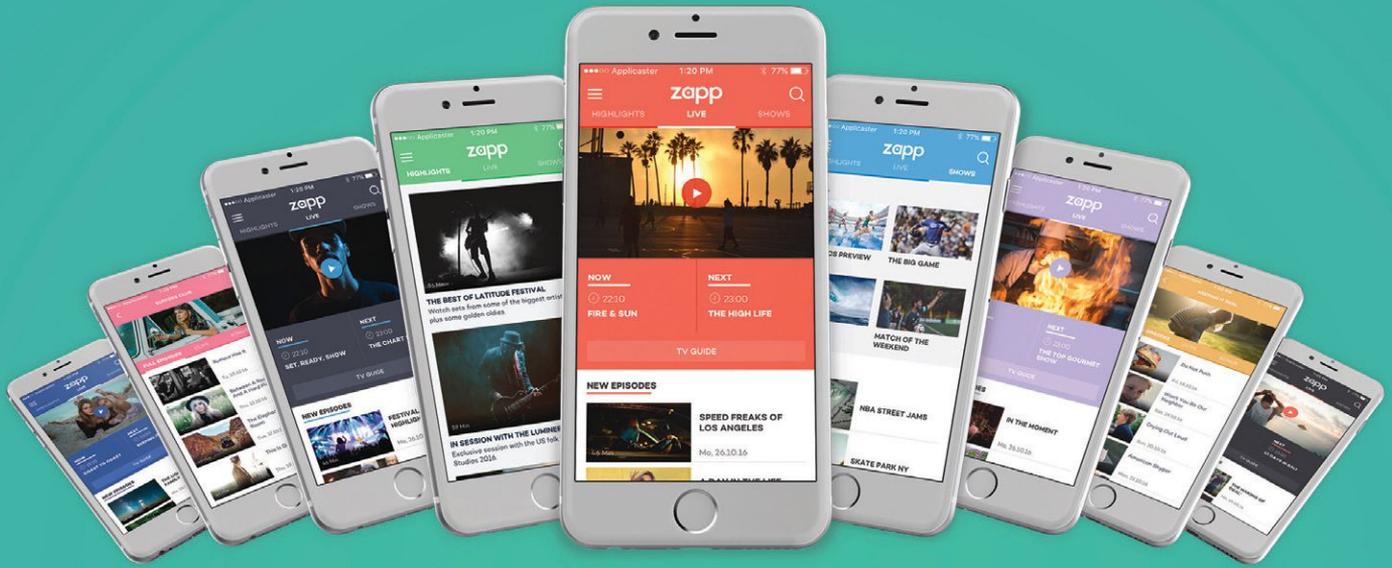
Inspiration through distribution

Ultimately, broadcasters and content producers are seizing the opportunity provided by OTT and non-traditional distribution, but delivering content in different ways is just the beginning. We are already seeing how the use of data can nudge producers towards developing ideas and creating content that is likely to be popular based on real-world trends. However, non-traditional distribution channels are likely to change the broadcast and general entertainment experience, whilst further blurring the real and imaginary or physical and virtual worlds.

The broadcasters that will succeed are therefore those that learn how to use non-traditional distribution to inspire the creation of non-traditional content – changing the content we consume and the senses it effects, as well as the way it is delivered to our screens. ■



Brian Morris is responsible for leading Tata Communications' global MES strategy to provide businesses with next generation managed services that drive the efficient production, management and distribution of digital media assets globally. As cloud, social and mobile technologies continue to shape the media and entertainment sector, his team is committed to empowering enterprises to capitalise on the new growth opportunities they bring.



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How to Stop Your Data From Driving You in the Wrong Direction

IT professionals are challenged to identify cost effective data management to meet the demands of business teams demanding agility and speed

By Ramon Chen, Chief Marketing Office, Reltio



We live in a world surrounded by data. Whether we're conscious of it, we make decisions in our every day lives based on discreet pieces of information. From comparison-shopping, to determining our projected retirement funds, data is the critical fabric that we use to ensure the best possible outcome.

Data is being generated every day, in ever increasing volumes and varieties. As devices get smarter, so does the flood of inputs that is supposed to guide and help make better decisions, faster. Whether it's getting a product recommendation that "you may like" while shopping on Amazon, to being remarketed and "retargeted" (a marketing term describing how you are shown a banner ad associated with a website you had visited), consumer data is being used to market products and services to us in a highly personalized way.

While some may consider it creepy, others see value when the timing and context are right. Personalized marketing can be a double-edged sword, however. An incorrect spelling of a name, the wrong conclusion of a preference can also lead

to the reverse effect. "You don't really know me at all" leads to the cliché of "you only get one chance to make an impression."

As we ponder the impact data has on our personal lives, we might note that our own workplace environments and tools have seen their share of dramatic changes over the years. We can now capture and store more data than ever. Easy-to-use visualization software allows us to better understand data, and detect trends.

The term "data-driven" is used freely to describe any decision made with data. For many companies a data-driven strategy provides a foundation for strategic growth initiatives. Having better access to the right data leads to deeper insights which most companies use to drive increasing efficiency and revenue.

For IT professionals the challenge continues to be one of cost effective data management to meet the demands of business teams demanding agility and speed. To provide insights and to enable skills such as a "data scientist" - the hottest job du jour - is to uncover patterns and insights in a sea of num-

bers and facts, all while ensuring governance and compliant access to information.

Meanwhile, business teams continue to look to move away from their dependency on IT. They want democratized access to data. The popularity of consumer-facing data-driven applications such as Facebook and LinkedIn fuel their desire for self-service and independence. With so much technology available and billions being poured into backend IT management, and SaaS or cloud-based business visualization tools, how much better off are teams today?

Is it just your point of view?

The IT and applications landscape is littered with acronyms used to describe a new set of capabilities to solve the problems of a target group within an organization. SFA (Sales Force Automation), then CRM (Customer Relationship Management) for sales teams; Marketing Automation for marketing, ERP and finance, HR, the list continues. Each application comes with its own database or store to capture, manage and maintain data to help automate and provide the information needed to achieve the objectives of each team and group within a company. Each one of these applications creates silos of data, with duplicate, uncorrelated and often-conflicting facts about customers, products, organizations and more.

Ten years ago, the need to bring these facts together itself spawned a technology, process and discipline called master data management (MDM). The goal was to create a 360-degree point-of-view by identifying and matching profiles across these siloed systems. Unfortunately, the complexity and cost of MDM made it affordable only to the largest companies. MDM's fatal flaw was also that the identification and reconciliation of profile data (i.e. name, address, phone number) ignored two valuable facts that were needed to derive an actual 360-degree view. Transactions or interactions related to profiles continued to remain siloed within applications. Without such detail that could include products purchased,

social interactions, and other behavioral characteristics, MDM was largely unsuccessful and business teams saw limited value from the billions of dollars invested.

True collaboration remains elusive

With data continuing to be siloed, uncovering relationships across all the entities or actors that make up the important business ecosystem for a company has become a top priority for executives. Billions more has been invested into Big Data infrastructure (Hadoop anyone?) and data lakes have been popular projects for over 5 years. The ugly truth about pouring data from multiple sources into a lake and allowing it to be analyzed by data scientists for macro-level insights through tools that offer predictive analytics, and machine learning, is that those insights don't help the "feet on the street". Those sales, marketing and other business teams and individuals, continue to rely on siloed data and applications.

In contrast, while consumer-facing applications like LinkedIn guide and provide customized and contextual insight to help in personal decision-making, workplace applications continue to languish. Note: Microsoft's recent acquisition of LinkedIn ironically highlights that such issues are on the radar of major technology providers.

Data, specifically master profile data, by its very nature is born, and continues to evolve throughout its life cycle. Names change, new addresses are added and so forth. While MDM seemingly helps the problem of blending and matching profile data across systems, it does not offer the scale and real-time access, with teams and individuals unable to contribute to collaborate effectively.

Closing the loop is the missing link

Due to siloed applications, insights are analyzed and processed in new data lakes, in traditional data warehouses. This demarcation between operational apps and analytical

insight continues to exist despite advances in technology. Macro-level insights rarely distill into the desired operational execution by business teams, and their actions are never accurately correlated to the origination of insights. A closed loop of relevant insight leading to recommended actions, and such actions resulting in actual outcomes is the only way in which demonstrable, measurable value can be proven. It's also the basis for which machines can really "learn" and produce better outcomes.

How to drive your data without really trying

If you're an IT professional, MDM should clearly top your priority list, for reliable data is the foundation. You also have to invest in big data infrastructure, to tie an expanded suite of sources, relationships and transactions to deliver a 360-degree view—all while using predictive analytics and machine learning to automate and gain the insights your company needs. As business users in sales, marketing or even compliance, you need a way of getting your job done faster, with greater efficiency. You covet the ease-of-use of consumer apps such as Amazon, Facebook and LinkedIn, and realize that collaboration is key to account-based strategies and initiatives.

The good news is that today modern data management platforms have built-in MDM. Like oxygen and water, reliable data is non-negotiable because poor quality data can drive you in the wrong direction. These platforms are architected with big data scale in mind. Analytics and machine learning are seamlessly integrated, distilling insights and recommended actions down to those relevant to individual users. They also come with a new generation of data-driven applications as part of each deployment, which act on a single unified pool of data for real-time collaboration. With actions audited, tracked and correlated back to originating insight, loops are closed; there is continuous measurement and improvement.

No longer do applications have to silo data and deliver functionality that only meets the needs of a specific group. Today everyone can benefit from a full 360-degree view of everything across the enterprise. That is the true promise of being data-driven. ■



Ramon Chen is responsible for worldwide marketing and product management at Reltio, a cloud-based data-driven applications and modern data management PaaS provider. Prior to Reltio, he spent several years as VP of Marketing at MetaTV, a leader in interactive television subsequently acquired by Comcast NBC. He has over 25 years of experience running marketing and product management teams at Veeva Systems, RainStor, Siperian and other companies.

Changing Decision Making With Micro Services and Big Data



Connecting data with high fidelity may be the industry's next big disruption

By Jon Christian, Founding Partner, Digital Supply Chain Lead; Rachel Kelley, Senior Manager/Lead, Data & Analytics Practice; David Liu, Principal, Digital Supply Chain Practice; Faisal Mahmoud, Senior Manager, Digital Supply Chain Practice; Steven Sabonjohn, Senior Manager, Digital Supply Chain Practice, OnPrem Solution Partners

Abstract: Just as the rise of digital assets fundamentally changed the way the industry had to think about its supply chain, we believe the next big disruptor will come from connecting data at a much higher fidelity than what is done today. The ability to exploit existing micro-level data, such as transactional data, to make real-time decisions used to be difficult if not impossible. Many times the data you were looking for was not captured, or by the time it became available it was obsolete. That has all changed with the emergence of API driven services, data and analytic tools, and cloud capabilities. Companies now have the ability to leverage the transactional data from services and audit logs to quickly get near real-time information on a granular level. This enables organizations to do things they previously could only imagine, from making real-time data driven decisions, to making more accurate forecasts, to allowing for more precise internal or external charge back models.

In the past, reporting and data were limited by the storage expense of logging detailed transactional data, as well as the computational cost of querying and merging data from separate databases. Business executives would ask for an analysis that would take days or weeks for an analyst to run the numbers, and often the data might not even be there at the level of detail needed to make accurate decisions.

Real-time decision making was limited in two ways within systems: first, by the complexity of the data relationships, such that more analysis

was needed to understand what data must be pulled in order to answer the business question, and second, by the time and effort required to develop code instrumented to gathering the required data - usually secondary to immediate business needs.

Building relationships between data was further challenged by the way systems and services have traditionally been architected. Data has been copied between systems, but the relationships between the data have not been accounted for. Legacy systems tended to be isolated and

siloed, with limited or superficial integration points. The exchange of data often only included status and simple UUID (Universally Unique Identifier), without information on what was completed and how. To complicate things more, if the valuable data was stored in the system database, it often resided in unrelated data schemas that failed to decouple meaningful data from internal operational status data. With limited access to the granular transactional data, most integrations were only capable (or willing) to integrate merely at a surface level.

Current advances

Today, the growing trend of micro services and APIs have done much to improve the ability to quickly access system data for decision making purposes. Additionally, cloud data providers make it easier to move data between different products / services under their umbrella.

The philosophy of micro services is to architect cohesive service units where each unit accomplishes a bounded, focused business goal, while providing an API to the services providing that goal. How does this help? Part of the goal of a micro service architecture is to construct your system in such a way that bigger things can be constructed by combining micro services in a composable way, similar to how houses and cars can be built from Lego blocks. Requests to micro services get funneled through an API Gateway, at which point client data gets extracted, transformed, and pushed into a data lake, or centralized pool of structured or unstructured data. The data lake supports big data applications. An API Gateway in front of micro services doubly protects backwards compatible clients by supporting release versions and decreases development time for new micro services for organizations already practicing continuous code delivery. Finally, as there is now an abstraction layer in between each platform, and development is streamlined for future integrations, managers of legacy systems can begin to evaluate the costs and impacts of swapping additional back end systems out for cloud born alternatives.

The use cases below give examples of how, at a high level, powerful insights and decisions can be made using a data driven, integrated platform of micro services. First, we illustrate how digital supply chain operations can realize tactical and strategic benefits. Second, we look at a more strategic example as financial systems are taken into consideration.

Applications

As mentioned earlier, currently integrated digital supply chain systems are often monolithic, with complex integrations and limited reporting data. When fully evolved to take advantage of this new paradigm, micro services would be used across the supply chain and vendors, both on premise and on cloud platforms, on a service by service level. The micro transactions' data pushed to the data lake would provide a wealth of information around the lifecycle of assets flowing through the ecosystem. On the surface, end to end delivery status, supply chain bottlenecks, and defects can be easily discovered and more efficient processes can be developed. On a deeper level, consumer and financial data could be tied with operational data to discover new and interesting relationships.

Imagine taking consumer usage data from services such as Netflix, Amazon, and Hulu, and using it to prioritize delivery and discover trends in your back catalog. Furthermore, because of the low overhead of integration and the ability to target a small, modular piece of the workflow, new vendors could be tried out on a single service basis, with data such as performance, defects, and invoicing cost used to make short or long term decisions. These are just a few concepts on how, on a tactical level, understanding the transactional data can create real impact on operations.

From a studio perspective, understanding each transaction could also have a deeper financial impact. One of the constant challenges of centralized operations is accurately charging back the costs and overhead of shared services.

As operations are pushed into the cloud (and SaaS vendors who provide services via the cloud), understanding the cost of operations becomes much easier. Content in the cloud is represented via its URI, or Universal Resource Identifier, allowing data to be captured in real-time, down to a fraction of a cent for those cloud services that are metered.

Linking in title information with the URI could paint a picture of the true cost of development and distribution, a data point that is currently often fraught with unreported costs and errors. When costs can all be billed back to the title, just imagine the impact for the studio. How could this information be used to aid in forecasting? Estimating cost and layering in information such as historic theatrical sales, home distribution royalties, current consumer viewing trends, and competitor information could be used to create complex and accurate models for forecasting.

Conclusions

Using micro services and combining them with a data and analytics toolset has benefits to both operations and strategy. Deep rooted, monolithic systems need to be broken up or integrated with micro service connectors to capture the data necessary to make these advances. Change is not only required with the technology, but also in the way data is conceptualized and analyzed. Analysts need to think outside the box and build relationships across tiers of data in what could be seen as unrelated systems. It is only then that this new ecosystem can take shape and the true benefits realized. ■



Jon Christian has over 18 years of consulting experience across industries with a focus on strategy, solution evaluation and end to implementation projects. Rachel Kelley has 9+ years of experience in M&E, with projects ranging from process improvement and content protection, to data strategy and digital supply chain systems. Dave Liu has 10+ years of experience in systems development and integration. Liu specializes in the M&E and Technology spaces, working on digital supply chain and technology strategy engagements. Faisal Mahmoud is recognized as one of the premier digital thought leaders in the industry, based on his extensive experience with digital video technologies, Digital Asset Management (DAM), TV Everywhere, and Digital Supply Chain engagements for enterprise, global companies. Steven Sabonjohn has enjoyed a 10+ year career in media and entertainment technology. He began his career at NBCUniversal, where his achievements included winning two Sports Emmy Awards for work on the 2012 and 2014 Olympic Games.

A Recipe for Efficiency and Productivity in M&E



Standard processes necessary to provide optimal consumer experience

By Harold S. Geller, Chief Growth Officer, Advertising Digital Identification LLC (Ad-ID)

Abstract: At the center of M&E is excellent, entertaining content and messaging, with superb scripts, acting, direction, and calls to action. Once you set those things aside as the precursors to any cross-platform content, you must evaluate as necessary ingredients the methods, techniques, and best practices required to do things efficiently and in a repeatable manner. This not only enables excellent creativity, but allows for that creativity to be consumed and measured across all media platforms and all consumer devices. The essential ingredients are standardized file delivery formats, metadata, and workflow, which together set the bar from which innovative entertainment and advertising content strategies can emerge.

A recipe is a list of ingredients and the instructions that describe how to prepare or make something. In the case of M&E, and in particular advertising, we are discussing the recipe to place content in front of the consumer.

In the past, disparate processes from a variety of entities served those entities and their partners well. Everyone was cooking from their own recipe. However, as ad-supported content is increasingly consumed across a

multitude of devices, by both linear and on-demand methods, the need for a consistent, shared recipe using the highest quality ingredients has become critical. Standard processes are necessary to provide an optimal consumer experience no matter what device the consumer is using.

As part of an ecosystem, we must start with standardized file delivery formats that contain the best available video, audio, closed captions, common identifiers, and metadata. Consistent application of these components will

result in efficient and reusable workflows.

There are several pivotal efforts underway to make progress in this area, and they are shining examples of cooperation that will lead to increased efficiency, and opportunities for further collaboration:

Eight leading trade associations serving the advertising, marketing, and video technology industries (*see graphic, next page*) are joining forces to create a series of guidelines that collectively simplify the distribution of digital ads throughout the video production sector.

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The Ad Consortium is involved in creating and implementing standards and establishing best practices for streamlining the workflows of ad scheduling and distribution.

The trade groups will establish three joint working groups to focus on file delivery specifications, advertising metadata, and audio specifications and best practices.

In addressing standards and making recommendations to simplify digital video advertising distribution, the working groups will help advertisers, agencies, and production houses to streamline cross-platform video delivery.

This unprecedented collaboration will chart a more efficient course to support consumer consumption and ease navigation across multiple screens, and to overcome current and future interoperability challenges.

The Ad Consortium

The Ad Consortium is involved in creating and implementing standards and establishing best practices for streamlining the workflows of ad scheduling and distribution. This effort will also integrate the tracking of talent, licensed element use, and payments across advertising assets.

Member companies of the Ad Consortium are stakeholders who play key roles and collaborate in the process of creating, distributing, and tracking ad content and making related payments by facilitating and automating processes in the ad life cycle.

The Ad Consortium provides a way for marketers and agencies to leverage premier solutions for what is reported and paid by:

- Identifying the best existing standard at each step in the process.
- Establishing an agreed-upon standard where one does not exist or needs improvement.
- Committing, as a collective, to adhere to these agreed-upon standards and making them open to the industry.
- Using Ad-ID, the standard for identifying ad assets across every media platform, as the common identifier and metadata source for ad distribution, traffic, talent payments, and rights and asset management across all integrated platforms.

Eight Trade Groups In Cooperation

The eight trade groups taking part in file delivery specifications, advertising metadata, and audio specifications and best practices initiatives include:



The Ad Consortium's goals are to:

- Establish open standards and best practices that help advertisers and their agencies efficiently manage the distribution and tracking of their assets.
- Implement fail-safe practices for accurate tracking and payment of talent and licensed elements used in advertising assets.
- Assist marketers through the maze of new and emerging media (VOD, OTT, HTML5, Social, etc.) by enabling standard and efficient delivery, rights-tracking, and talent business management.
- Where possible, provide new opportunities to advertisers through electronic distribution and scheduling, allowing for last minute air buys in an increasingly dynamic environment

UniversalAdId

The Interactive Advertising Bureau's (IAB) Video Ad Serving Template (VAST) is the industry standard delivery mechanism developed for video ads across multiple platforms. The latest version, VAST 4.0, focuses on improving the quality of video ads by adding

support for features like server side ad insertion, a mezzanine file, and UniversalAdId.

The UniversalAdId, such as Ad-ID in the United States, is used to provide a unique creative identifier that is maintained and tracked across all systems.

Implementing a UniversalAdId standard for the creative identifier ensures that an individual video ad will have a single, unique identifier across publishers and campaigns. This helps bring digital video metrics more in line with those that exist for TV by providing the ability to control, track, and measure ad creatives accurately. Having a unique identifier creates efficiencies in workflows and, by enabling all associated data to follow across systems, allows the creative to be consistently tracked. This facilitates streamlined data collection, improves reporting accuracy, and provides real-time measurement when running cross-platform campaigns.

Watermarks

Coalition for Innovative Media Measurement (CIMM) and Society of Motion Picture and



Harold Geller's advertising career spans over 30 years in the U.S. and Canada. He worked in media buying/planning, account management, financial and technology roles at MindShare, Ogilvy & Mather, and McCann Erickson, among other companies, before joining Ad-ID, which is a joint venture of American Association of Advertising Agencies (4A's) and the Association of National Advertisers (ANA). Geller speaks and writes extensively regarding interoperability, digital workflow and metadata in advertising.

Television Engineers (SMPTE) standard for Open Binding of IDs (OBID) is focused on using watermarks to associate unique identifiers with content — Ad-ID for advertising content and Entertainment Identifier Registry Association (EIDR) for program content.

This initiative is developing an open watermarking standard for binding into the essence of an audio/video a content identifier that can survive through the entire supply chain. The watermark will be leveraged to enable granular cross-platform audience measurement, in addition to other innovative capabilities.

CIMM expects that the OBID audio watermark technology partner(s) will be selected before the end of 2016, and drafting of the standards will begin. The next step will be to promote the use of these watermarks, including at all industry technical and measurement conferences, as well as through pilot programs that demonstrate their utility.

Unique advertising identifiers

Ad-ID Selective and Complete External Access (CEA and SEA) are industry tools that

Ad Consortium Members

Adstream

Burns Entertainment & Sports Marketing

Comcast Wholesale

Entertainment Communications Network (ECN)

Syncro Services

The Team Companies

Yangaroo

provide validation of unique advertising identifiers and the retrieval of necessary metadata for Ad-ID codes through an API interface.

Unique identifiers and associated metadata about ads must be accessible for operational purposes, and CEA and SEA will enable innovation in ad operations, ad decisioning, and audience measurement. Consistent identifiers and standardized metadata are vital for efficient and accurate processes within the supply chain.

Open access to Ad-ID's metadata facilitates cross-platform management, provides new automation capabilities, and can improve validation processes for cross-platform measurement.

With the proper ingredients and agreed-upon instructions from leaders within the advertising ecosystem, as discussed above, the

entire marketing community benefits from streamlined processes and seamless workflows. Collaboration around common goals creates the recipe for sustained growth.

These initiatives, which bring together industry associations and participating companies in the supply chain to solve pressing challenges, are the right ones, at the right time. They are foundational to enabling common processes and practices to satisfy the ever-expanding digital appetite of marketers and consumers. Implementing these practices across the marketing and communications ecosystem will result in meaningful standardization throughout the supply chain, thus increasing efficiency, profitability, and growth for the industry. ■

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Controlling Content Access in a Borderless (Internet) World

*Service providers are getting smarter about geo-filtering
for internet-savvy consumers*

By Tom Thomas, Senior Consultant, Cartesian



Abstract: Massive improvements in access, speed, and quality have given meteoric rise to internet-delivered content over the last few years. Owners and distributors of content have licensing agreements largely based on geographic boundaries; consumer appetite for content, however, is borderless. The combination of OTT content platforms and the existence of cross-border online pathways, such as VPN, facilitate access to content worldwide, making content distribution more difficult to monitor, safeguard, and ultimately, control. This article delves into the challenge that content owners and distributors are facing to meet their licensing and distribution agreements and what can be done about it.

The last few years have seen a steep rise in the consumption of internet-delivered, or streamed, content versus traditional television. This change, along with recent technical innovations, is causing disruption of a fundamental pillar of the content owners' license model: the control of content release windows on a country-by-country basis via content distributor partners. Online service providers (Over-the-Top players), apply geo-filtering and other mechanisms in their services to restrict content access. In response, consumers use geo-circumvention methods to bypass restrictions. Whenever a popular circumvention route is blocked, a new one pops up to take over. Netflix referred to this situation as a "cat-and-mouse game." Will it ever end?

It is typical for content owners to license material to service providers (SPs) with strict territorial restrictions regarding access. Service providers, in turn, detail geographic usage restrictions in their Terms of Service (ToS) with customers. Mechanisms to restrict access to their content library are deployed by SPs to enforce their license obligations. In the case of an SP serving a single country, for

The practice of geo-circumvention detection gives SPs options for control beyond simple blocking of users. There is the opportunity to steer users towards legitimate routes to the desired content.

example, attempts to play content elsewhere should fail, with a message presented to the user. Other SPs, such as Netflix and Amazon, which have multi-geography presence, will present content catalogs tailored to location in addition to applying technical mechanisms to control access.

Geo-detection: How it works

In order to determine a user's location, most SPs analyse the IP address of the device attempting to access the service. The SP may query the IP address as part of every request the user makes to its website or Content Distribution Network (CDN). These requests include login, browsing, title selection, and queries at various playback points. This IP address is then compared against a geo-location database to determine from which location the attempt to play is coming. There are several third party geo-location databases available.

It is widely known that the U.S. Netflix catalog has significantly more content titles than any of Netflix's other national libraries. This has resulted in a significant number of its Canadian subscribers using circumvention mechanisms as a way of gaining access to the content they can't find at home. This is an example of the content access battle. Whether consumers are aware of, or understand, the restrictions in their ToS, or have a laissez-faire attitude towards content, when faced with a content block many users will find alternative means to access the restricted content. This is a particular issue due to the ease with which these methods can be quickly shared – via social media, forums, etc. – and is not merely the preserve of a small clique of specialists.

Geo-circumvention: How it works

There are two primary means of bypassing geo-blocking technologies. The first, a Virtual Private Network (VPN), allows a private tunnel to be formed between the user's device and a remote server. The remote server is in the target country and presents a public (internet facing) IP address in that location. VPN services vary

in their breadth - for example, the number of devices that may be used, monthly download limits, choice of endpoint servers, etc. Services with payment plans that are based on volume of data may become problematic for users consuming large amounts of high-bandwidth video.

The second approach, a Domain Name System (DNS) proxy, is generally aimed at users wishing to perform geo-circumvention of video streaming sites rather than internet privacy. Unlike VPNs, there is no inherent privacy in a DNS proxied connection. DNS proxies sit between the user and SP filtering specific HTTP requests that are destined for that SP, whilst leaving other general internet traffic untouched. The filtered requests are rerouted via a proxy server within the target country that presents a local IP address to the SP. These simple DNS proxy mechanisms may be free

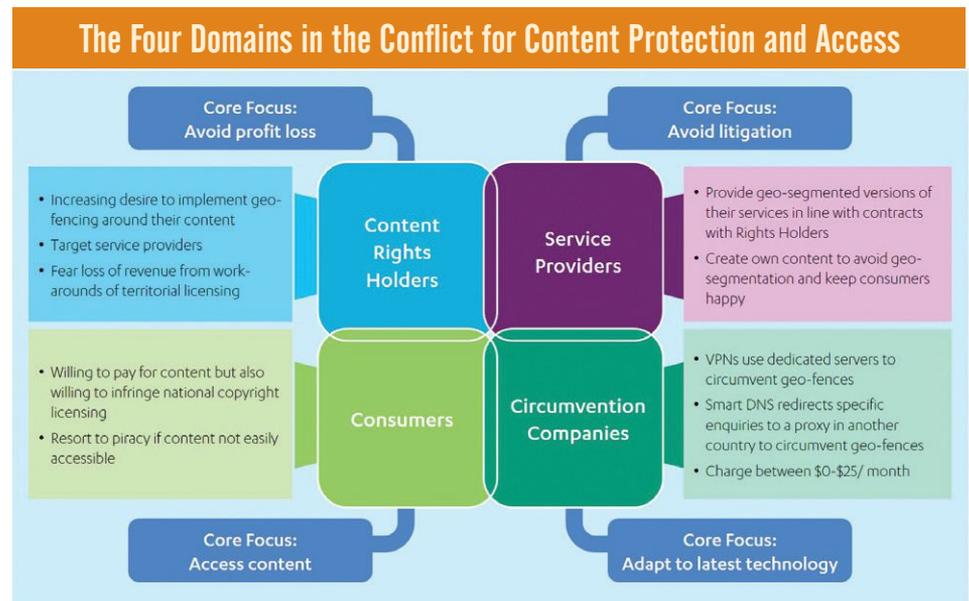
or paid for, but are generally cheaper than a VPN mechanism. As an added advantage for the user, DNS proxies may be setup on a user's home router, which would allow all devices on the home network to take advantage of the mechanism without having to intervene on each device.

The majority of VPNs and DNS proxies are application based, but the most convenient mechanisms are browser plugins. Although convenient, they will only work with browser-based services.

Geo-blocking: SPs strike back

Until early 2016, some SPs were reticent on the topic of blocking, and especially on penalizing users who flouted their ToS. Indeed, to go down this road, there must be robust evidence that a user is deliberately seeking to

Continued on page 113



Sources: Cartesian, Smart DNS Proxy, That One Privacy Site

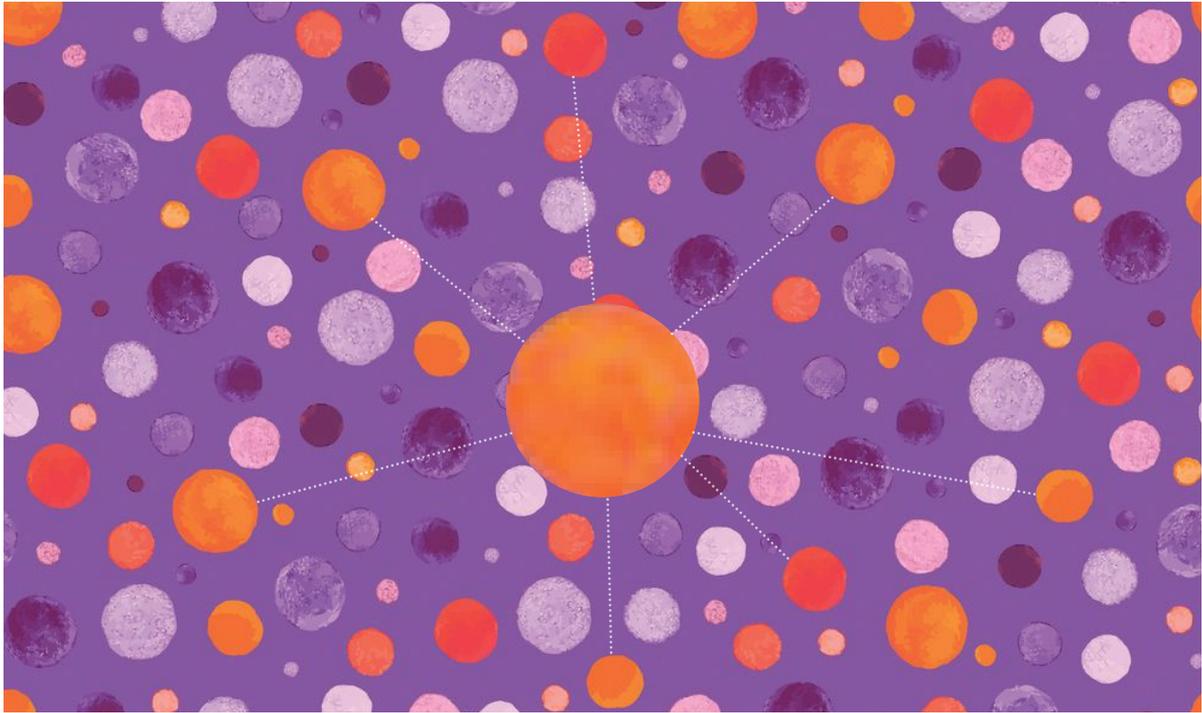
This graphic highlights the conflict between the interests of consumers and content creators, the pressure on service providers, and the innovation drive of 'circumvention companies'.



Tom Thomas is a security expert in the digital TV space with detailed knowledge of CA and DRM systems and their implementations on contemporary STBs and other platforms. At Cartesian, he provides commercial and technical advice to clients, and conducts the Farncombe Security Audit on digital media content systems.

Profit From Aligning Distribution Readiness Reporting With Avails

Distribution readiness reporting increases the maturity of the digital supply chain



By Jason Peterson, CEO, and Doug Reinart, Board Advisor, ContentBridge Systems

Abstract: This article addresses “distribution readiness,” an aspect of digital supply chain management that is seldom covered but represents a significant opportunity for owners of digital content (movies, TV shows, shorts, music) seeking to maximize the profit potential of their libraries. Distribution readiness begins with the way media assets and metadata are ingested, stored, and associated with a title’s rights and avails. It is enabled through automation that detects the presence and condition of each required title element based on the specific needs of downstream business partners such as retailers and exhibitors. Distribution readiness provides actionable insights for more profit. ContentBridge is the first provider of an automated platform for assessing and reporting on distribution readiness.

We easily take for granted the intricacies and complexities that underpin our daily lives. Take, for example, a stroll down the supermarket aisle, or an emergency trip to the auto parts store. More often than not, you find what you are looking for (or a close substitute). Or, if you are like us walking through a Costco, you become distracted with big screen TVs, pre-fab barbecue islands, and fourteen-pound slabs of beef brisket before realizing you’ve made no progress accumul-

ing items from the wife’s punch list. That’s the quality of the retail experience today, and it is fed by a web of supply chain interactions that extend through multiple layers and across oceans. Things work the way they do because of honed processes, communications, and standards.

That’s the physical world, but what about digital? For the most part, give or take the occasional bandwidth constraint in prime time, digital content storefronts are as intuitive (and sometimes as creative) as your typical

CVS Pharmacy aisle (the one with all the red vines and Boost twelve-packs) –lots of variety and you fairly easily get to what you are looking for. And just like their physical counterparts, digital storefronts belie the supply chain complexities that feed them. But in the case of digital, there are far fewer honed processes, communications, and standards.

Take for example distribution readiness (sometimes referred to as fulfillment readiness). This is a fundamental signal for sales and operations planning (S&OP). S&OP is about

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balancing demand for a product (quantity, time, and place) with the available supply. Too much supply, and you are hit with the many added costs of excess inventory. Too little supply and you face stock outs, lost sales, and dissatisfied customers (maybe even contractual breaches). Most physical supply chains have scaled the mountain in terms of establishing sound S&OP practices. Sure, there are plenty of exceptions, but those supply chains will quickly address that gap or cease to exist. The practical knowledge of demand and supply balancing for physical goods is easily accessible to competitors that will eat a laggard's lunch.

Fulfillment readiness is one of the key potlucks that Operations brings to the S&OP party each week (or month). Fulfillment readiness requires an understanding of the deliverables required for each demand set (a fancy way to say 'finished good'). It also requires clear knowledge of many inputs (here's a few):

- *on-hand finished goods both allocated and freely available (What do I currently have to satisfy demand?)*
- *in-process or in-transit finished goods (What finished product will be coming through the door shortly to satisfy additional demand?)*
- *the transformation process that creates the finished good (How long and how many resources do I need to make additional finished goods)*
- *the ingredient set required for each finished good variant (What do I need to make a particular finished good?)*
- *the state (format, quality, condition) of each ingredient (What exact type of ingredient do I need?)*
- *the sourcing and transformation process required to have ingredients of the proper state (How long will it take to get the additional ingredients I need?)*

Physical supply chains have evolved to "control towers" and advanced, constraint-based planning systems. These exercises are becoming increasingly routine.

Fulfillment readiness in the digital supply chain

What about fulfillment readiness in the digital supply chain? Well to begin with, inventory costs are not as big a concern (although storage is not free). And if you have a limited library of digital content and transact to a small number of business

partners, the supply chain complexity is not great. However, when you scale to hundreds of titles comprising thousands of elements that require transformation and distribution to dozens to hundreds of business partners, fulfillment readiness can make or break your ability to execute on sales and participate in the market.

In 2014, ContentBridge Systems published an article in the *M&E Journal* looking at supply chain maturity models as a way to track the maturity of the market and assess operational capabilities of individual players against the market's maturity.

We introduced a five-stage model:

- **STAGE 0 – Basic market access: assets in assorted physical and digital formats**
- **STAGE 1 – Improvement in fulfillment capability: assets in a repository**
- **STAGE 2 – Reduced cost to serve: assets in consistent formats**
- **STAGE 3 – Achieve scalability: distribution ready library**
- **STAGE 4 – Capitalize on new revenue: enterprise wide integrated flow through order processing**

Distribution readiness reporting as we are describing here moves the maturity of the digital media supply chain from Stage 2, where we are reducing cost to serve by normalizing assets in consistent mezzanine formats stored in one or more asset repositories but where research is still required to determine fulfillment readiness, to Stage 3. In Stage 3 we are achieving scalability by way of not only a normalized service-ready library with a prescribed common ingredient set for each title, but also providing automated reporting on element availability, quality, time and cost to serve relative to territory, language, and business partner requirements.

Matching readiness reporting and avails

Imagine a common scenario in which a studio is approached by a television channel in another country like Bulgaria that is interested in licensing the right to exhibit a library of titles in 4K in the local language with the necessary timed text, metadata, trailer and artwork all localized. The studio avails system easily pinpoints that 4K broadcast and OTT rights are available in Bulgaria. However, supply chain questions immediately arise:

- *Are all or some titles distribution ready and available to deliver as requested?*
- *For those titles that are not distribution ready, what is their status?*
- *What is the "ingredient set" of elements required to fulfill on this sale?*
- *What is the state of each element relative to the required state?*
- *What is the time and cost to upgrade existing elements to the necessary quality requirements and/or create missing elements?*

It is possible that a transaction could be unprofitable because the time and cost required to deliver on the rights transacted exceeds the value of the transaction to the parties. It's true that sellers with market power have often required buyers to create localized elements for their own markets. However, the time and cost of doing so can make transacting untenable and impede profit opportunities for sellers. This is becoming even more relevant in the era of global digital storefronts like iTunes, Netflix, Google, and others that will rarely take the prerogative to produce localized elements and complete ingredient sets for titles. Rather, it is the studio-distributor's prerogative.

By matching a distribution readiness reporting capability with an avail reporting capability we now arrive at a robust capability to

Continued on page 114



Jason Peterson works to define the market opportunity and leads the development of ContentBridge's software tools and high throughput cloud infrastructure. He is also the current Chairman of GoDigital Media Group (godigitalmg.com), Cinq Music (cinqmusic.com), VidaPrimo (vidaprimo.com), CEO of AdShare (adshare.tv), and past founder of GoDigital Distribution (godigital.com) (now known as Amplify Releasing).

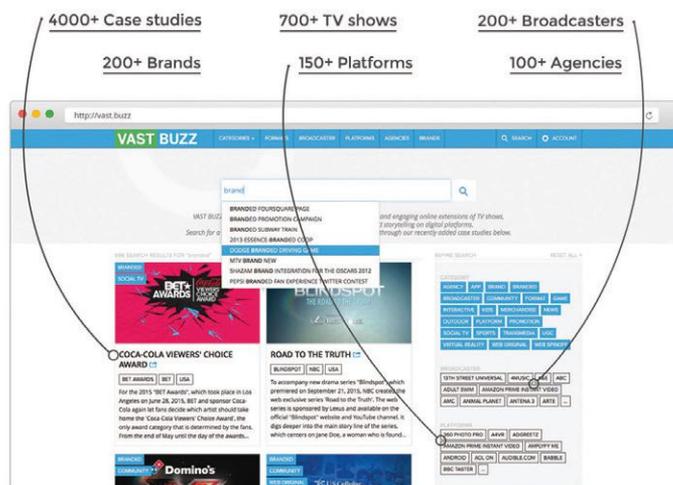


Doug Reinart is EVP Strategy for Vision Media Management & Fulfillment, in addition to his advisory role at ContentBridge. He possesses over 30 years of experience, with an emphasis on digital and physical supply chain solutions for the media and entertainment industry. He served as VP Strategic Accounts for Technicolor, EVP Worldwide Operations for Paramount Pictures Home Entertainment, and Partner at PRTM Management Consultants.



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Addressing Avails Challenges and Solutions in the World of Digital Delivery



*Avails accuracy guarantees
consumers have the best possible
entertainment experience*

**By Michael Kadenacy,
CEO, My Eye Media**

Abstract: In today's vast world of digital delivery, the accuracy of avails data and retailer implementation of the data are of the utmost importance. Ensuring that avails data is accurate and properly implemented by the growing number of retailers and MVPDs around the world presents a number of unique challenges, which are being addressed by new and transformative workflow solutions built with automated cloud-based systems.

The concept behind content avails has always been simple: give digital retailers precise data regarding when a video is available to run, where it can publish, how it can be monetized (along with associated information, like languages and formats).

But the avails process has been anything but simple. Before recent work to standardize avails (especially by the Entertainment Merchants Association) most everyone — content companies and retailers alike — had looked to develop their own systems, their own internal infrastructures, to handle associated content data, with different workflows and disparate formats. If you're tracking something that's in a spreadsheet, manually altering it in order to be delivered to just one particular retailer can be problematic, to say the least.

The proliferation of digital outlets that a content owner can distribute its content to today — whether it be SVOD, VOD, or EST — has certainly opened up monetization opportunities that previously didn't exist. But without standards — the collaboration of content owners and industry partners standardizing what's required in avails — they can be unwieldy, and potentially problematic.

In this globally connected world, making sure your ratings are correct in each territory prevents a major consumer experience problem (although, that may be the least of your worries when it comes to inaccurate avails data). Think about all your international



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In this globally connected world, making sure your ratings are correct in each territory prevents a major consumer experience problem.

release dates, and their release windows: if you have content that's cleared for a certain release date, those first three to five days of availability are vital for generating revenue. Consider your legal and contractual obligations. If something's not down when it's supposed to be, it presents a potential contractual problem.

Why is the accuracy behind avails important? Because it means consumers have the best possible experience. If there's something that hasn't been availed properly, if there's something not up when it's supposed to be up, you lose your audience.

For companies like ourselves — supply chain supporters and developers — having a standardized avails format allows us to develop tools to help our clients make sure their content is accurate on their storefronts, that what's supposed to be there is there, when it's supposed to be available.

Avails over the years

Avails is a term that's been around for years in the M&E space, and is simply a shortened version of Content Availability Metadata, the subset of data needed to help content owners communicate with retailers about when and where a piece of video will be made available online, along with the product's title, run time, resolution, and distribution format (SVOD, EST, etc.).

Seeing avails delivered in everything from the body of an email to PDFs to JPEGs, the Entertainment Merchants Association (EMA) began creating a list of best practices and standards for the delivery of avails, releasing its first pass on standardizing avails in early 2013.

Over the years, EMA's avails workgroup — which today includes representatives from Google, Amazon, Microsoft, MovieLabs, Netflix, Rovi, Sony and more — has tackled a host of issues surrounding avails. Among the first avails challenges that was tackled was developing around 40 standardized fields to cover every possible piece of information a retailer needed to schedule an online video for consumption. The avails working group also

settled on two forms of avails delivery: Excel and XML, with the end goal being 100% adoption of the latter.

EMA reported almost instant results once retailers began incorporating the avails standard: what used to take days when it came to ingesting avails was now being done in less than an hour, with errors that previously haunted the process almost completely eliminated. First used exclusively for movies, the EMA Avails Template eventually became of use for TV titles as well.

But the explosion of new digital services in the last couple of years — namely in the over-the-top space — has kept EMA, and the industry at large, on its toes when it comes to the avails template, with new distributors and new ways of distribution opening up new avails issues that have needed to be addressed.

That's resulted in the EMA tackling a host of issues in the avails space, including better addressing the multiple VOD and EST windows a title may have; how different distribution formats for a title need to be addressed in the same country; the inclusion of the Full Extract best practice, which includes both the current and future avails a content owner wants to communicate to any platform; the addressing of TV specific problems around avails to address both season and episode issues; and more.

Tools for avails accuracy

For us, it's about the accuracy of the delivery of avails, and the standards behind it, because it allows us to offer more robust services and tools to content owners.

In March, we launched our Storefront Testing and Online Retail Monitoring

(STORM) metadata-monitoring platform, geared toward both studios and content creators. It's a highly scalable service that helps companies check the accuracy of listings across distribution platforms, using automated, cloud-based software, covering release dates, pricing, product placement and other basic metadata like titles and descriptions.

In the past it's been challenging for studios to verify products are correctly displayed and marketed, managing hundreds of outlets and manually double-checking metadata. My Eye Media STORM helps them to instantly check online and see the status of their content in stores worldwide.

My Eye Media STORM has helped fulfill a real need in the industry. Because we're a global business with a global workforce, we open access to territories that logistically wouldn't otherwise be efficient for content owners to access.

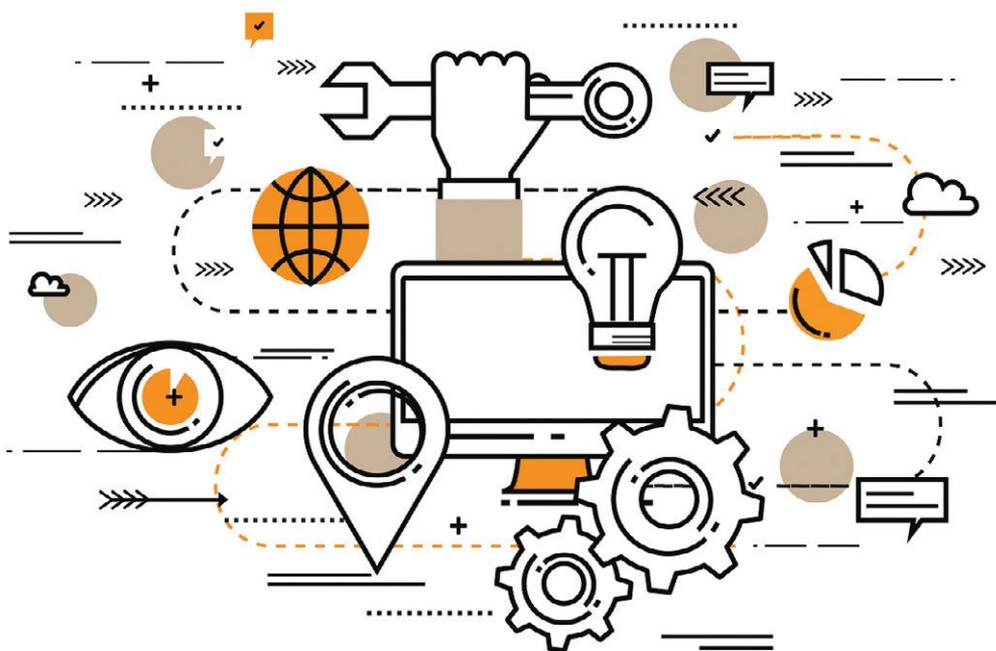
We offer a centralized portal to see what their content looks like, internationally, across storefronts. Instead of having to call a colleague in Germany, they can just use our software to see how their content is displayed, and be much nimbler when it comes to addressing any potential issues. Before, it might have taken weeks before an international issue could be addressed. Now it can be done almost immediately.

My Eye Media STORM allows studios and other content owners to check the accuracy of digital storefront listings, covering numerous distribution platforms worldwide. And while adoption of avails standards across the supply chain has been inconsistent, progress has been made, thanks to the tools that have been made available. ■



Michael Kadenacy is an accomplished entrepreneur with a career spanning 25 years, in post-production operations management and international supply chain servicing for television, optical media, VOD, EST and OTT. His unique vision and expertise in operational workflow, database management, team building and customer service have shaped My Eye Media into the largest most technically advanced testing and quality control facility in the motion picture industry.

The Move Toward Digitizing Back-Office Processes



*Bridging the gap between production data and financials
has never been more critical*

By Darren Ehlers, VP of Products, Entertainment Partners (EP)

Abstract: Historically, making a production and paying for a production were largely unrelated— handled by separate groups, with separate tools and data. However, technology improvements and efficiencies are forcing the two to become interdependent. Increasingly, it's becoming apparent that this information—which has lived in the non-digitized schedule or the budget for so long—has not been readily accessible. Consequently, other parts of the production, as well as the studios, have suffered. Moving forward, studios that successfully bridge production data with financial data will see dramatic gains in efficiency, decision-making capabilities, accuracy and compliance. Those that resist change, continuing to rely on costly, manual systems, will find themselves at a disadvantage.

In terms of utilizing technology, production office progress has been painfully slow. Paper scripts, paper timecards, paper purchase orders, the need for handwritten signatures. Until recently, the only real innovations behind the camera were the move from regular mail to email, the adoption of cell phones and the use of consumer technology in the production office. Fortunately, accounting software was created—pulling the entertainment industry and its reliance on paper ledgers out of the Stone Age. Systems were developed that tracked millions of dollars in costs. Still,

ironically, as digital effects evolved beyond our wildest dreams, there simply wasn't a wholesale rethinking of the back-office platform, and what could be accomplished electronically.

Lucky for studios, these days the line between making a film or television show, getting the production paid, and systems that house invaluable data is blurring rapidly. Certain products have come to market that are automating many aspects of the process. Studios are being steered away from the labyrinth of never-ending boxes of paper that comprise "document management" and distribution.

Efficiency

There's really no other business like entertainment. Upwards of 300 people come together for 10 to 12 weeks to make a product, spend \$120 million dollars, and then poof...they disband. Yet, the product lives forever.

With so much of the back office processes being done by hand, it's no wonder problems have arisen. Consider the longstanding tradition of paper scripts, for example. In 2014, Seth McFarlane, Universal Pictures and Media Rights Capital were sued for alleged copyright for the megahit *Ted* which grossed \$550 mil-



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A studio-wide retrieval system provides a centralized platform for managing, storing, searching and accessing virtually every kind of document in an organization.

lion at the box office. Bengal Mangle Productions filed the suit, alleging that the concept for the film had been lifted from its web series, *Charlie the Abusive Teddy*.

McFarlane and the studio ultimately prevailed in court, proving that the inspiration for Ted was derived independently, but likely at a tremendous cost. One can picture teams spending months and months of hours rifling through boxes to find the original copy of the paper script. Had they been using a robust automated system that stored the original screenplay, the lawsuit would have been immediately dismissed.

When an actor from a popular 1970s film passed away, his estate sued a studio relating to a residuals issue. A team was then tasked with tracking down a call sheet from the 40-year old movie. The employees didn't even know what building the document was in, let alone which box. Needless to say, lawyers historically have often found it easier to just settle these kinds of cases.

On the other hand, attorneys have been aggressive regarding retention policies. Documents must be retained for seven years, but antiquated paper systems have made this difficult. With new technology, it's beginning to dawn on studio executives that they can actually have retention policies that are enforceable. An audit from the Directors Guild of America (DGA) requires a dizzying array of different kinds of documents that include payroll, contracts and production reports, to name only a few. With no centralized database, it can be highly problematic tracking all of these things down. A digital repository that brings these documents together with the push of a button saves time, money and resources.

Compliance

Productions have become increasingly subject to scrutiny in terms of compliance. From sexual harassment training to employment verification to incentives tracking, entertainment is a complex business subject to vast state and federal laws and regulations. Systems that can track these kinds of issues are becoming invaluable. For example, if a crew member is discovered after-the-fact to have

been working on an expired visa or driver's license, a production can be disqualified from receiving a tax credit for the person's wages, in addition to incurring other legal penalties. With digital start packets, these potential problems can be dealt with at the outset.

Since productions are often mobile with traveling crews shooting in remote locations—often in a variety of cities and states, adhering to the respective sick leave and minimum wage rates further complicates matters. In greater Los Angeles, for example, sick leave and minimum wage not only vary from city to city, but by jurisdictions within those cities. This means that a crew member could be entitled to \$10 per hour on a shoot one day, and \$10.50 per hour the next. Penalties are steep. One can see how a digital platform that integrates this information is necessary to stay accurate and in full compliance.

Safety

Of course, crew and talent safety is always a major concern. The Occupational Safety and Health Administration (OSHA) has the capacity to shut down any production at any time for safety violations. In fact, OSHA has listed entertainment as one of the top industries for which avoidable accidents happen. Pyrotechnics, explosions, aerial lifts, falling objects—with everything that goes into making a production, this shouldn't come as any surprise.

In 2014, a 27-year old camera assistant was tragically killed by a train in Savannah, Georgia while working on the film, *Midnight Rider*. Subsequently, the production was cited for willful and serious safety violations after OSHA investigated the incident. This was an egregious example of a production flagrantly disregarding crew safety. Still, the tragedy underscores the need for digital systems that provide safety oversight.

In another one-off situation, production

workers on a television set in Santa Fe, N.M. experienced an outbreak of Valley fever. Despite warning the production workers of the outbreak, one crew member claimed he hadn't been told and subsequently filed a claim against the productions. The digital system allowed the production company to prove that everyone had been warned.

Security

Traditionally, production offices have generated vast amounts of documents, shared through unsecure files, and emailed by multiple stakeholders over various platforms or providers. These days, automated systems in production are increasingly utilizing closed loop security for document management. This protects scripts as well as the Personally Identifiable Information (PII) of production workers.

Studios and production companies are right to be concerned with hacking and large-scale data breaches, but what if papers with PII were simply stolen...say, off the back of a truck? Not long ago, a Fed Ex truck containing boxes of tax documentation from a production company was robbed in New Mexico. Once the company learned of the theft, it was required to notify everyone whose information was on that truck. Luckily, the company used an automated system that made retrieval of all email addresses and phone numbers instantaneously accessible. The robbery happened on a Friday evening, and by Monday morning the company had purchased Life-Lock for all the potential victims. That could only happen in a digital environment.

Digitized platforms can also help stop fraud. Matching a production's schedule with purchasing is difficult with paper, but a digital ecosystem makes it much easier to decipher when something is out of whack, like a production accountant who is making pur-

Continued on page 114



With over 17 years of experience leading cross-functional teams, Darren Ehlers currently drives the Movie Magic Scenechronize Technologies division at Entertainment Partners (EP). The co-founder of Scenechronize, the No. 1 cloud-based document management solution for the entertainment industry, Ehlers is responsible for product planning, strategy and integration. He has repeatedly exceeded top-line and P&L goals for start-ups and enterprise software companies.



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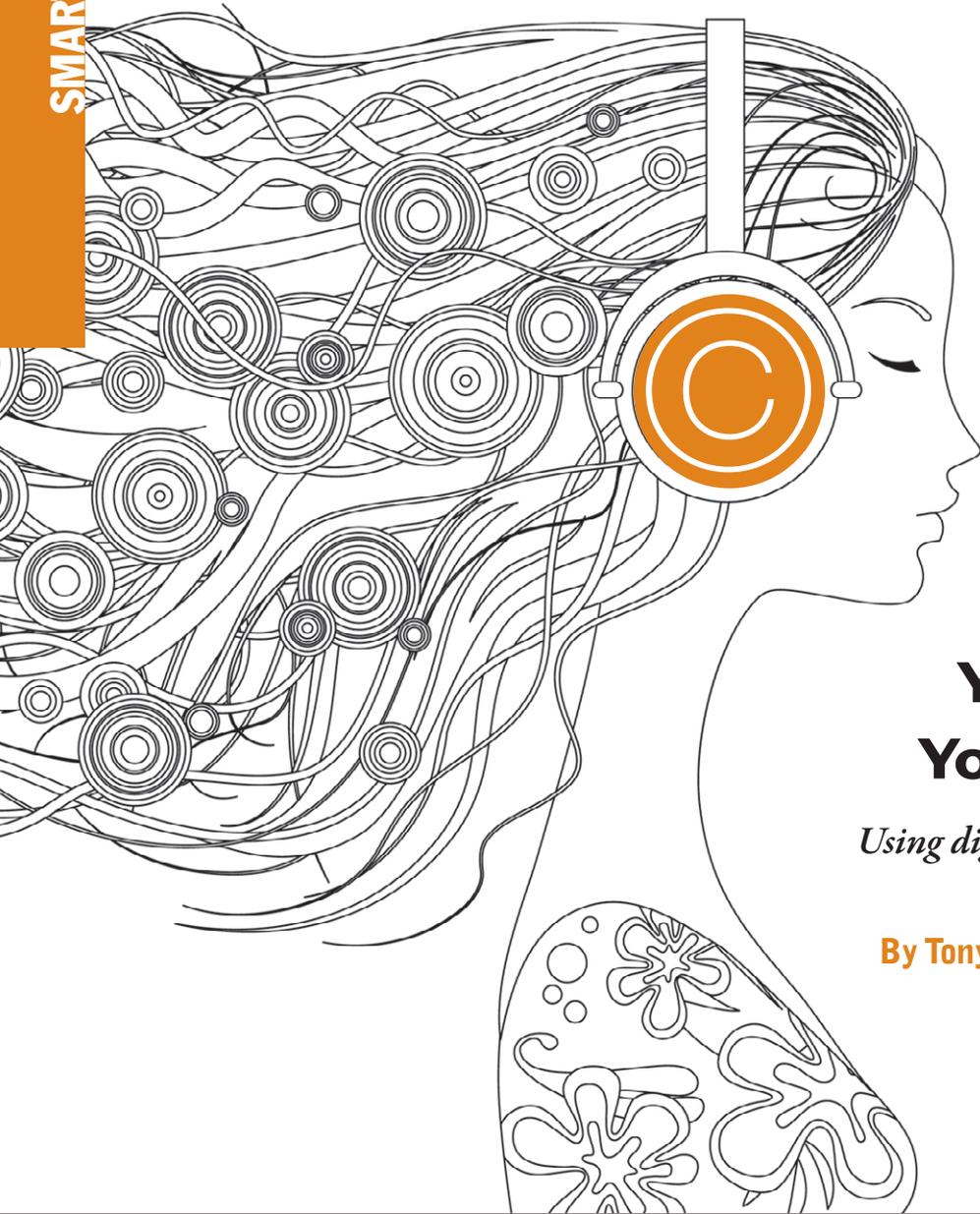
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You Play It, You Pay for It

*Using digital identification for music
royalty verification*

By Tony Rodriguez, CTO, Digimarc

Abstract: It is currently estimated that more than 75 percent of production music is not accounted for. How do you ensure background music and sample library rights holders can verify appropriate royalty accountings? How do you do this without disrupting the producer's process nor compromising the consumer experience?

The answer is through digital identification technology. There is a need to create and implement future-proof systems that leverage content intelligence and metadata for production music royalty verification. Content intelligence and digital identification create new efficiencies and process automation so that content production companies can ensure artists, fans and copyright holders are all satisfied.

Copyright: The primary form of protection that empowers and safeguards artistic creativity. Creators of “original works of authorship” are protected under the laws of the U.S., which provide legal rights for the material and usage. In the music business, the protection granted by copyright enables artists, composers, publishers and producers – anyone with a gift for music – to make a living doing what they enjoy. At its heart, it promotes creativity as a valuable talent. For this reason, copyright is a respected statute. Persisting through time and adapting to changing technology, from vinyl records to CDs and digital files on the internet, however, copyright laws are regularly playing catch up.

The complexity of copyright law

Copyright infringement has been a dizzying topic full of complexity, and the associated challenges and legal issues have increased tenfold as technology advances. Remember the VCR? It was a device that dazzled the public when it made its debut and enabled consumers to record a show and watch it at their leisure. Yet, people in the U.S. nearly lost the right to record from their televisions because of copyright issues. A landmark case in the 1980s, Universal Studios vs. Sony

Using new forms of digital audio identification in addition to established fingerprinting approaches offers an exciting development for creators in the music industry, providing an exacting and future-proof method for artists and producers to gain the recognition and compensation they deserve.

Corp. of America, posed the question of whether recording a television program with a VCR was “fair use” under copyright law. Sony argued that it was, Universal argued otherwise. In the end, the Supreme Court decided to allow home recording in a 5-4 vote.

Copyright infringement has long been a contentious topic of concern. This issue has only been compounded with the proliferation of digital devices that make it easier than ever to approach – and cross – the line of copyright infringement.

No other business is feeling the pain of copyright issues, challenges, and violations quite like the music industry. In the digital age, there is an enormous concern when DJs, producers, artists, songwriters, and more aren’t getting paid for their creative work. Their music is being used unknowingly and without their consent. In essence, their production is being pirated and their livelihood threatened. The notion of, “you play it, you pay for it” is falling to the wayside as the task of identifying a song, categorizing ownership, serving a notice, and paying the fee has become a Herculean effort. Audio rights management is often regarded as the most complex and difficult topic in the music industry.

As more people produce music and the internet further cements itself as the primary distribution mechanism, the world of music becomes increasingly crowded. This has led many music creators to devote time and energy to music licensing in an attempt to earn money through royalties. Film and TV producers, advertising agencies, game developers and Web developers are then able to legally license music for their specific needs. However, now an artist’s work gets played across a vast array of distribution channels and media outlets, leading to greater opportunities for others to access and misappropriate the content. Without a consistent, enforceable tracing mechanism, the content owner loses control over their material and subsequent revenues from its use.

The “safe harbor” provision of the Digital

Millennium Copyright Act further complicates audio rights management, allowing content delivery networks to stream any content that users upload until a copyright owner requests it to be taken down. These provisions enable content delivery networks to support music and attract an audience. However, it is being done without explicitly licensing the musical content as the content services are not required to ask permission or issue a notice of usage.

The challenge of identification

The digital music industry seems intent on making music more broadly available to consumers while placing a secondary consideration on building systems to enable publishers and songwriters to be paid. How is a music creator supposed to track all of this? How can they manage where their music is being used?

In addition to the sheer number of artists and media platforms, compositions are often truncated and used in snippets and/or mixed with sound effects and voice-overs, making identification even more challenging. Today, it’s more common for production music to be licensed by different suppliers, further complicating any sort of resolution for use. In totality, these issues create tremendous identification burdens for monitoring and reporting systems and further disenfranchise the creator and legitimate owner.

The questions to ask are how can the music industry reconcile the concerns, which at their core are hindering the growth of the industry itself? How does it ensure music and library rights holders can verify appropriate royalty accountings? How can this be done without

introducing additional administrative burden, disrupting the production process, or compromising the listener experience?

Content intelligence for royalty verification

Fortunately, there are a number of players supporting digital identification technology as a means to address these challenges, with content intelligence that can provide royalty verification. As regularly discussed, music metadata is a key component as it includes a wealth of information that should persist alongside a music piece as it travels across the digital realm. When metadata is properly identifiable, it can help guarantee appropriate and timely compensation for the owners of musical content. However, being able to effectively identify, monitor and track the content through distribution and transcoding is critical for a long-term solution.

As the music business grows more diverse through the development and proliferation of new technology systems, the need for a solution that can monitor and automate the process of identifying song titles, ownership, and licensing authority to help with the dispersal of royalties grows more acute.

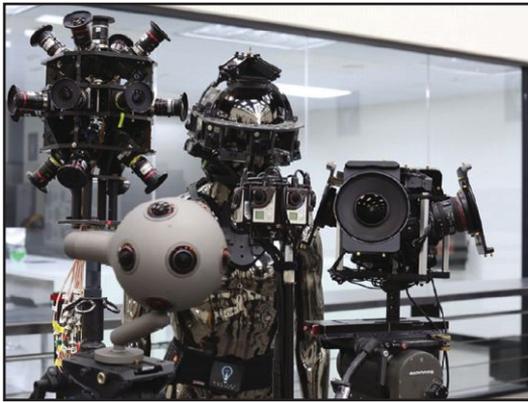
Previously, the industry used a technique known as “audio fingerprinting” in an attempt to automate tracking and royalty verification. Like image recognition, music signals are matched against the waveform within large reference databases. There are systemic problems in this approach used alone that can result in false positives and missed detections. With a low success rate in detecting music cues shorter than five seconds, misidentification due to mis-

Continued on page 112



Tony Rodriguez has been an integral leader of innovation efforts at Digimarc since 1996. He has 25 years’ experience in computer science and image processing research and development and is the inventor on more than 40 issued U.S. patents and 90 pending patents. Rodriguez is also the author of several published papers on the topic of digital watermarking.

FURIOUS M *Continued from Page 38*



Camera choices and rigs can vary widely.

camera GoPros to multiple RED EPICs and Lightfield technology. It's important to understand what you gain or lose in choosing your image capture system.

For example, RED EPICs will provide the filmmaker with better grain, image quality, control over exposure and temperature, and the ability to genlock cameras with time code in-sync versus a GoPros setup.

When shooting VR on set or location, production teams work with a cluster of cameras pointing in multiple directions or a single camera with a nodal head. The visual capture acquired from these cameras needs to be reconstructed and stitched to a stereo pair, one for each eye in a HMD.

The new dimensions of VR capture expand the complexity of production planning and post, and as a result VR requires an updated workflow. While similar to existing 3D pipelines, VR requires additional considerations. At its core, the stitching process involves the removal of any image distortion introduced by the lens, matching common features between each camera's captured footage, aligning all the frames into lat-long space and exporting the camera files for further compositing.

Many automated stitching applications are intended to ingest footage and then deliver a final, web-compressed video for distribution. However, very few offer a solution for source material with a higher bit-depth or dynamic range.

The methods for creating a manual stitch can vary immensely depending on software, artist skill, and choice of cameras. Given the complexity to synchronize, match, align, correct, stabilize and stitch footage, choosing an automated or manual stitching workflow will depend on how much control and flexibility is desired.

Presently, there are several stitching software choices available in the marketplace such as Videostitch, PTGUI, Autopano and the Foundry's CARA. However, there remains a

strong need in the industry for an automated stitching solution to reduce the labor intensive stitching process.

AMD recently announced 'Project Loom' a new real-time 360° video stitching technology and is collaborating with Radiant Images in Los Angeles. The Project Loom stitch solution will be able to pull files from up to 24 camera feeds at 1080p and 60 FPS, then stitch and output the resulting 360° video at 4K resolution and 30 FPS to VR headsets and mobile devices.

Radiant will offer "new solutions to clients who need live streaming of VR and multi-cam capturing from virtually any camera system, without the need of massive computing power" according to the company's Michael Mansouri. The ultimate goal will be to create a much more dynamic cinematic experience for viewers.

Where are immersive experiences headed? And what is the end game? As creatives begin discussing VR projects, one of the great technical advances is AR, which is beginning to emerge in practical applications. The recent popularity of the mobile game *Pokémon Go* is an indication of the scope of the opportunity for AR. The combination of VR and AR or mixed reality format for storytelling has extraordinary potential. ■

FINLEY *Continued from Page 8*

can have on the "secret sauce" of TV media-placements that keep the lights on at ad agencies and fuel the core revenues of our industry's advertising-supported businesses. According to Vitaly Tsvin, SVP of business intelligence for AMC Networks, speaking at the recent IBM World of Watson event, the use of cognitive computing is already helping the company make smarter marketing decisions, while bringing more viewers to the right platforms. Tsvin told the conference audience recently, "As we deploy (Watson's) advanced analytics, it helps us achieve our main objective: improve the business. We're arming decision makers with easy access to insights, so they can find their own 'ah-ha' moments. We're using AI to deliver game-changing insights on a silver platter."

And, while we have just begun paddling into the "big data" tsunami, our data scientists will need to invest deeply in this emerging group of new technologies to unlock the secrets currently hidden within those data clusters that will ultimately lead to an enriched customer experience and increased corporate revenues. ■

MEDIA SCIENCE INTERNATIONAL

Continued from Page 23

of watermarking (rights owners vs. distributors) and there is no consensus on whether and how the cost burdens could be shared by the various players in the ecosystem.

This issue is further exacerbated by the fact that, these days, piracy itself has become more of an OTT phenomenon, and a global one, at that. A pirate site providing access to current content is available instantly all across the world. Therefore, a single leak of content could be available everywhere. As a result, it is difficult for an operator to justify capital investment in implementing watermarking within its own footprint, unless they are assured that rights owners are requiring all operators to implement similarly stringent policies. It is important for content owners to be consistent in their contractual arrangements in different regions.

None of these concerns are addressed in the MovieLabs' document. But if forensic watermarking is to scale and succeed in a true B2C context, with sustainable and supportable implementations that provide measurable ROI for distributors and make a dent in the losses due to piracy, there will need to be some level of collaboration, coordination, consistency and sharing of investment risk by the various entities in the ecosystem. If the industry can achieve this, we will definitely see a reduction in unauthorized, un-monetized redistribution of premium content. ■

MICROSOFT *Continued from Page 62*

wants to be in the datacenter business anymore, and datacenters are rife with underutilized, depreciating assets. And what of security, which tends to be the least ROI-friendly activity; that is, unless you count the loaded costs of your average data breach?

Part of the problem is that these kinds of investments, and the needs for high performance computing and storage, outpace most studios' P&Ls. The rigor required to build and maintain the infrastructure is not generally a core-competency of the Producers Guild of America—yet this is exactly what's being asked of production executives. Let someone else do it, instead.

Security and content protection need to exist at every point, in every stage, on all content and by default through: encryption, watermarking, access control, monitoring, logging, and auditing. In addition, studios increasingly need to keep metadata synchronized and relevant across all assets in the value/production chain—which is much easier when data is centralized.

And who is accountable, anyway? When the production insurance underwriters come along and want to know who's responsible, or an auditor looks at the balsa-wood door protecting your on-stage "datacenter", where do you point?

It's so much better to say, "Them!" and know that the right things are being done; after all, it's easier to recover if you plan for failure.

Commercial break

Protecting customer data is at the core of what we do in Microsoft Azure. Security is fundamental to the processes, operations, policies, and mechanisms that make up our cloud services; the results of which are clear in the broad range of industry, international, and government certifications held by the platform.

The truth is, running your environment in the cloud can actually enhance your security posture—particularly when that cloud is industry-accredited for media and entertainment by the CDSA and the Federation Against Copyright Theft (FACT), and formally assessed by the MPAA. Moving to the cloud consequently shifts part of your overall risk profile to an organization ideally structured to handle it, with IT security and personnel investments running into the hundreds of millions of dollars annually. When combined with your own secure processes, risk management, and recovery planning, the likelihood of catastrophic loss drops enormously.

Finale: monetize!

Compliance leads to security, and security leads to compliance—they both improve your risk outlook and provide assurance to executives, producers, and investors that you did it right. Guidelines such as the CDSA CPS, MPAA Guidelines, FACT audit, and others put you in the right mindset for implementing secure systems and provide a methodology for testing, analysis and revision.

Make sure your cloud provider has these, because audits and assessments show they're doing what they should, and what they say they are doing. The benefit to you as a subscriber is that you have assurance and contractual commitments regarding issues of security, isolation, transparency, data location, access control, privacy, monitoring, availability, disaster recovery and much more.

In the end, you'll be able to extract value out of more of what you have, over longer periods of time, with less effort in the cloud. Following industry standards will require you to document processes and policies, which helps solidify your approach to make it repeatable and easier to identify problems.

No more film cans. No more tapes. And soon enough, no more wires either. ■



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TERADICI *Continued from Page 26*

as well. In this way, IT can maintain control of systems and creative assets alike, without restricting artists' work.

The last piece of the puzzle, which has emerged more recently, is the rise of cloud computing. Rather than managing their virtual workspace infrastructure in-house, companies can now choose to host their applications in any of the various public or managed private clouds that have emerged – including AWS, Google Compute Engine, IBM Softlayer, and Microsoft Azure, among others. By taking advantage of the massive infrastructures these mega-cloud providers have to offer, companies gain the additional assurance that their virtualized environments will not only be able to scale to meet project demands, but that their systems will be supervised by a dedicated security staff, around the clock.

Don't let your guard down

Naturally, in today's ever-changing landscape of online threats, no single technology can promise absolute data security. New software bugs

will continue to be discovered, and unforeseen events ranging from natural disasters to failures caused by human error will always pose a threat. What's more, setting up a virtualized environment isn't necessarily easy. There are unique challenges involved, and most customers will likely want to consult with a vendor with experience in this area.

Nonetheless, in today's data security climate, the need to mitigate the risk of intellectual property theft more than outweighs the relatively minor pain to implement this technology. Little wonder that virtualized workspaces are already in use by M&E companies ranging from vFX giants like Industrial Light and Magic to small postproduction shops. The fact that workspace virtualization addresses multiple challenges faced by M&E companies simultaneously makes it a very promising option for this industry – one that's already being used to improve editing workflows and lock down security on an ever-growing roster of Hollywood films, feature animations, TV shows, and more. ■

The Montreux Jazz Festival in Switzerland, which got started 50 years ago in 1967 by a visionary named Claude Nobs, had great insight into its future data needs.

HGST *Continued from Page 41*

service, or establish a private cloud in-house? Even after digitization of the concerts, should they preserve and keep the tapes? Do they really need to keep all 15 generations of tape going back to 1967, even though it is nearly impossible to even find the tape drives to playback these old tapes? Do they really need to recycle the tapes to prevent deterioration? Do they use a one-site archive, a two-site asynch site, or a three site geographically spread (geo spread) configuration? How do they test the archive, and against what volume of users? Do they expose the archive outside of the Festival's firewalls? How do they allow students at EPFL to access, edit

and metatag the various files?

This deployment has taken nearly seven years from its infancy to finally going into production. Today, they are nearly through this huge undertaking.

One thing though is clear: they needed to understand the five stages of data that are being generated every year for the last 50 years. They had to create workflows that met their budgets, solved their performance targets, and met the organization's SLAs within the technology constraints at hand.

In the end, achieving this goal was music to their ears and to their eyes, and to ours as well. ■

DIGIMARC *Continued from Page 109*

led retitling or sampling, and the difficulty with ambient noise, these systems are limited in their ability to differentiate similar content.

To solve the music industry's vast supply chain problems, a more comprehensive and accurate solution needs to leverage the meta-data-derived content intelligence and digital identification techniques to create new efficiencies in automation. This will allow content production companies to ensure artists, fans and copyright holders are all satisfied.

This level of digital identification could be achieved by leveraging inaudible digital codes that map to references and database records. Similar to the way that GS1 issues UPC barcodes (universal barcode identifiers) to help with the global identification of products, inaudible signaling could provide unique and unambiguous detection, thereby allowing unmatched monitoring.

The most advanced of these digital identities could be enhanced into audio and can endure typical file changes, such as format conversions or down mixing. While historically associated with some degradation in audio quality, prominent providers in the space have documented extremely minute alterations to the audio quality, inaudible to the human ear. Additionally, these types of digital identities are difficult to tamper with or remove from the file, providing both a unique ID and an added layer of security.

Unlike fingerprinting, advanced digital identification technology is deterministic. The deterministic nature of identification allows the ID in the track to be read directly versus probabilistically matched against an external database. This approach provides more accurate information and can more effectively authenticate track title, ownership, and license authority.

Using new forms of digital audio identification in addition to established fingerprinting approaches offers an exciting development for creators in the music industry, providing an exacting and future-proof method for artists and producers to gain the recognition and compensation they deserve. If the copying and distribution of people's artistic creations continues without regard, the music industry will suffer, as artists of all shapes and sizes may not be able to make a livelihood with their musical creations.

If that happens, we all lose. ■

CARTESIAN *Continued from Page 95*

change their perceived location – implying that the SP can only restrict users who it knows with surety are attempting to perform geo-circumvention. Any action on geo-enforcement was also likely to upset some of its customers.

However, whether it was because of pressure from content rights owners and the threat of litigation, the availability of new detection methods, third party firms starting to offer detection as a service, or a combination of these, SPs have been improving enforcement. For example, in line with its launch into 130 new countries at the start of 2016, Netflix, the leader of multi-geography OTT streaming, tightened up its ToS and geo-enforcement measures.

Ultimately, the SP is in the best position to develop a holistic geo-enforcement solution, as only the SP is privy to logs containing both IP address and user account details. Geo-circumvention is detected by comparing a user's IP address against a database of known IP addresses that originate from circumvention mechanisms. Detection techniques are generally a combination of manual spot-checking and automated intelligence gathering. For example, a big data analysis could reveal that accounts that are

consistently appearing to be located at the same range of IP addresses, which could be due to the use of a proxy.

Geo-location companies continually monitor and track the ever evolving circumvention providers as they move or add new IP addresses. However, this is not an easy exercise. VPN providers will seek to go the extra mile in order to stay undetected as providing client privacy is their *raison d'être*. Also, in response to detection and geo-enforcement actions, popular geo-circumvention vendors actively keep their user base abreast of when the latest round of geo-blocking has been bypassed. This ongoing pursuit and evasion of circumvention mechanisms has been referred to as a constant game of cat-and-mouse. Still, there are signals of the start of a turning tide: uFlix, a popular unblocking vendor for the Australian market, announced in August that it was going to “stop supporting Netflix as an unblocked channel,” citing unaffordable time and resources required. This is the first known public admission of a vendor admitting defeat.

The future of geo-filtering

The practice of geo-circumvention detection

gives SPs options for control beyond simple blocking of users. There is the opportunity to steer users towards legitimate routes to the desired content. With the triplet of data available to the SP — account ID, geo-location, and content ID requested — much can be learned about user behavior and this information used to inform the business model going forward.

The more drastic option is account termination of users who repeatedly breach the ToS by using geo-circumvention mechanisms. While for the SP this means a lost customer, for the content owner this approach risks driving users towards other means of accessing the content, such as via P2P torrent sites and other forms of piracy.

With the VPN/DNS proxy market predicted to continue to grow, it is clear that this cat-and-mouse game of geo-filtering and circumvention will continue for the foreseeable future. SPs must keep evolving their technical and management solutions to meet the ingenuity of new circumvention mechanisms. Though with improved detection technology and analytics, they are catching up - giving better assurance that the content rights agreements between the service provider and owner are being upheld. ■

Take the Easy Road.

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Data & Analytics
Consumer Applications
API Strategy & Design
Content Management Systems
Content Monetization
Digital Media Supply Chain
Online Video Players

ZOO DIGITAL *Continued from Page 69*

mented by remote freelance staff using their own software tools. As a result, subtitle files have to be harmonized to ensure that all client deliveries are quality checked and consistent. In traditional localization operations, a significant element of cost is in administration of the workflow itself – initiating projects, selecting translators, distributing instructions and proxies, making deliverables consistent and fulfilling orders.

Cloud computing is transforming this ecosystem through the emergence of a new type of localization service provider that employs software-as-a-service, enabling proxies to be streamed and subtitles created within a web browser. This gives much greater scalability by drawing exclusively on flexible skilled labor around the world, simplifying information exchanges, and centralizing client content and localized assets in secure cloud storage. Such providers have far less need for office locations in each country, and instead are able to tap into a geographically diverse workforce in a far more cost-efficient and agile way.

MESA Europe identifies best practices

Recognizing the challenges faced by the industry in this area, MESA Europe has formed a localization council to foster end-to-end collaboration amongst entertainment service providers. “Improved communication and processes are needed to drive efficiencies in the face of shrinking release windows, tighter budgets and a growing number of file formats,” said Jim Bottoms,

Executive Director of MESA Europe. “A more ‘joined up’ approach between theatrical, home video and broadcast groups may help relieve some of the pressure as the industry strives to respond to a fast paced digital business, where quality and tight deadlines cannot be compromised.”

There are a number of key characteristics that will be exhibited by vendors of the future, setting them apart from those of the past:

Hybrid service and software

The days of pure service companies are numbered. The vendors that will excel will not be those that simply have a capability for software development, whether in-house or outsourced, but rather those that have innovation embedded within their DNA. This is more than a matter of capability, and more fundamentally of culture and mindset. Digital transformation often calls for ripping up the rule book, challenging the status quo and inventing new ways to deliver far greater efficiencies internally and on behalf of clients.

Highly scalable operations

Through partnering and the use of networks of remote workers, vendors of the future will be capable of far greater scalability in throughput than previously possible, enabling the unpredictable ebbs and flows in client demand to be accommodated gracefully. This facilitates the highly responsive and agile operations required by M&E companies.

Embracing cloud computing

Scalability of services implies the same of software systems, and the use of cloud computing as the foundation of its operations enables an organization to flex compute, storage and bandwidth resources according to demand. However, cloud computing should not be simply a bolt-on to a traditional operation but the agent of change to bring about radical redesign of workflows, enabling transformative changes to enable collaboration and greater efficiency.

The use of production and management information systems deployed in the cloud ensures a consistent toolset throughout the ecosystem, supporting collaboration between studio groups, online retailers and vendors. Integrated asset storage gives clients secure access to data 24/7 and the means to self-serve.

Support for client-centric workflows

Integration of information systems for order placement and fulfilment will become critical, as well as supporting the unique workflow requirements of each client organization as a key feature of service delivery.

A collaborative approach

Successful vendors will operate collaboratively, sharing with clients the benefits that technological innovation brings, and being open and transparent. This means full disclosure of operations so that clients have complete visibility of the production pipeline, the status of orders and deliverables. ■

CONTENT BRIDGE *Continued from Page 98*

identify and take advantage of new revenue opportunities in a profitable manner.

By way of example, one major studio created a project to assess the distribution readiness of its entire library, restore or create all necessary elements for 21st century distribution, and to ingest and manage a cloud based distribution ready library with advanced on-demand localized manufacturing and fulfillment capability powered by ContentBridge. This saved the studio a net present value of over \$100 million in digital supply chain costs.

ContentBridge is now making available the world’s first commercially available distribution readiness reporting platform. ContentBridge can probe available media, metadata and collateral elements and assess their distribution readiness relative to the output requirements of all major retailers, exhibitors and digital supply chain standards including but not limited to Entertainment Merchants Assn. (EMA), IMF, CableLabs, Media Manifest, and others.

The industry has spent the past several years standardizing avails reporting around the EMA avails specification. Now ContentBridge submits a new standard in distribution readiness reporting to complement EMA standard avails. ■

ENTERTAINMENT PARTNERS

Continued from Page 106

chases at high-end retail stores long after the production is over.

Conclusion

Studio executives are busy, frequently overseeing multiple shows and productions. A studio-wide retrieval system provides a centralized platform for managing, storing, searching and accessing virtually every kind of document in an organization. From financial data, to compliance, to safety, digitized platforms are reducing the need (and cost) of physical storage. Further, mobile applications and customizable executive dashboards are able to provide real-time feeds and alerts.

The bottom line is that when production companies and studios move to a digitized back office platform, they can do things that were never possible in a paper-environment. Are you onboard the digital production train? ■

YURKOVIC *Continued from Page 12*

DAM transformation

The solution to this era of higher expectations resides beyond the hardware; content itself needs to become smarter. By embedding our industry's content with layers of data we will contribute to redefining the future of Digital Asset Management and ultimately changing its most common acronym from Digital Asset Management to Content

Management Solutions (CMS). DAM harkens back to an era of storage, walled-off from the workflows that distribute and process the ultimate product. To be efficient and effective, Content Management Solutions, meanwhile, will connect the content repository to the content's final destination, requiring three components to work integrally together: people, processes and (interoperable) technologies.

Content will only get smarter by utilizing human capital, innovative tools and up-and-coming automation technologies like AI and machine learning. By connecting the appropriate technologies, simplifying processes and proper change management, content owners will be able to deliver not just smart content but great content to consumers. ■

WAZEE *Continued from Page 76*

archive in a matter of weeks, if not days — something that could take months of planning and implementation for a company whose content was stored behind a firewall. He could also power his social media experiences, such as YouTube channels or Facebook, from the portal. And he could quickly and easily create a retrospective or topic-specific episode by pulling in any bit of relevant content — such as interview footage with Steve Jobs and Bill Gates for a show about technology.

In terms of monetization, if he chose, Rose could use the portal as a sales vehicle, licensing his content to national or international broad-

casters, VOD services, educators, documentarians, film studios, and more.

Conclusion

A media entity unto himself, Charlie Rose has demonstrated how media companies can overcome a trident of problems — managing a physical archive, managing a digital archive, and managing new content as it comes in — while making better use of the content they own. By employing a full digital strategy that took his content out of the vault and onto the web, Rose has a secure, future-proof means of leveraging his intellectual property in a much more meaningful

way. It's something that can only be achieved in a cloud-based implementation.

When media companies pair cloud storage with cloud-based asset- and rights-management services, they can create secure, sophisticated repositories that not only preserve their content for the long term, but make it easily available to both internal and external parties for use today.

In that way, media companies can get out of the archiving business and focus on what they know best: content. Once the cloud archive is in place, all they have to worry about is how best to repurpose the assets. And that's a much better problem to have. ■

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The change from legacy DVR to nDVR is similar to the larger shift to network computing services, largely for purposes of convenience (for customers) and also cost-effectiveness and future-proofing (for operators).

unique copies for each customer, similar to the way in which a traditional DVR works. This ruling allows cable operators to piggyback from Cablevision's nDVR approval, as it ensures that there are not additional license or contractual agreements required by each content provider.

Over the next few years, nDVR is expected to play an increasingly large role in cable operator strategies. One major reason is the perceived trend of cord-cutting, specifically among younger viewers. The 2015 Home Broadband study from the Pew Research Center found that almost one-fifth (19 percent) of Americans ages 18 to 29 had dropped cable or satellite service, with another 16 percent saying that they had never even had it.

nDVR could help address this trend in several ways:

■ *nDVR capabilities could also be paired with so-called "skinny" bundles of a relatively few channels, with content streamed to internet-connected devices.*

■ *A/B testing and modifications to existing services could be trialed via the scalable, flexible nDVR infrastructure.*

■ *Finally, nDVR is a perfect fit for a world in which many consumers have multiple mobile computing devices and are just as likely to watch a show at an airport or on the road as they are on their home HDTVs.*

Why nDVR is set for a bright future

DVR capabilities (record, pause, fast forward through commercials, rewind and restart) are commonplace for many cloud-based OTT services, such as Netflix and Hulu, so consumers increasingly expect it from cable operators, too. Licensing issues have held back the rollout of

nDVRs in the past (the Cablevision case being the clearest evidence), but cloud-based policy engines could open up new opportunities for content control and rights management.

At the same time, the rise of nDVR should be a boon to consumers. They will be able to avoid costly and noisy STBs, as well as other pieces of customer premise equipment that can break down, lose recorded shows and require costly replacement. nDVR solves a common problem for consumers when their DVR breaks down: recorded shows are not "lost," and they can be accessed from a variety of other devices.

MVPDs can also expand the DVR feature set more economically through nDVR. Without limitations of a particular set-top box implementation, MVPDs can offer more simultaneous recordings and more storage to consumers. In addition, centralized processing of recorded content can enable consumers to view recorded content on retail devices, in more locations like outside the home. These compelling features can be delivered to IP-capable DVR set-top boxes as a further enhancement to an existing DVR customer.

Evolution Digital is helping lead the way toward nDVR solutions for operators through its eVUE-TV platform. With nDVR capabilities soon to be available on hybrid QAM/IP set-top boxes, such as Evolution Digital's eBOX, which also aggregates IP-VOD services, incorporating nDVR into a cable operator's video offering has never been easier or more cost-effective. And, as cable operators migrate towards network-based DVR offerings for consumers, they will want to migrate towards hosting content on their private network, rather than "cloud" DVR functionality that streaming apps use (i.e. Sling TV) over the open internet. ■

from above in the corporation with pre-conceived brand messages and hypotheses, but by the consumers themselves, who drive much of the buzz and customer service through social networks, review sites, microblogging platforms, and other information sharing tools. Leveraging of digital media is so pervasive that consumers have access to information any time at any place on any personal device.

In this emerging marketplace, the practice of data analytics is being implemented to understand the consumer intimately. Data has become the new factor of production, like labor, land and capital. Resources for data analytics, which have historically been centered in research, marketing and finance, are being linked and leveraged with unprecedented results. The expected challenges of modeling and self-service analysis are being met with success. Consumer data is being utilized to develop content.

Innovative endeavors of CIOs, CTOs and CMOs have demonstrated that tolerance and openness toward potential partners, developers, vendors and third parties can build an ecosystem with huge potential value for growth of industry revenue. The extended enterprise created by the studios with the help of their partners has enriched the industry where the sum of the parts is greater than the whole.

Thomas Friedman said it best, "Supply-chaining is a method of collaborating horizontally where among suppliers, retailers and customers – to create value, it is both enabled by the flattening of the world because the more these supply chains grow and proliferate, the more they force the adoption of common standards between companies so that every link of every supply chain can interact with the next, the more they eliminate points of friction at borders, the more the efficiencies of one company get adopted by the others, and the more they encourage global collaboration." It is this evolving digital supply chain superiority that will be the basis for winning companies where value chain performance will translate to reduced time to market, productivity in content creation, and superior ability to shape and respond to demand with innovative products and services. ■



Eric Hybertson leads a team of highly skilled engineers and vendors that has been instrumental in growing Evolution Digital's set-top-box business in both market position and reach. Prior to joining Evolution, Hybertson was the Director of Rendering Devices for Time Warner Cable. Hybertson's entire career has been spent in the cable industry, where he has also worked with companies including Advanced Digital Broadcast, Solekai Systems and Harmonic.

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YUME *Continued from Page 122*

Path to executing successful cross-screen campaigns

The impact of fragmentation can create a ripple effect throughout the entire ad campaign process, but addressing it at every point along the way will minimize its impact and help drive toward a more successful outcome.

Planning: Planning media spend across channels is an art, and arguably one of the most trying parts of a marketer's job. It is intricate in nature and requires many decisions about the right marketing channels, channel vendors, tactics, variables to control for within channel and KPIs to optimize towards such that holistically, and globally, the marketing strategy converges yielding desired results.

Targeting: Fragmentation creates problems for marketers when keeping track of audiences. Lack of brand messaging relevancy can cause negative brand sentiment. Fragmentation also complicates targeting as each device type has its own environment and is therefore able to collect and then pass on different information to the buyer's targeting requirements. The Open RTB Consortium was created to address this issue and has been widely adopted, but not all screens are yet Open RTB ready. Tracking consumer behavior is crucial to create a more relevant relationship between the brand and the consumer.

Measurement: When it comes to measurement, fragmentation causes many vendors to use different methodologies to report on relevant metrics. While there is currently no unified standard all adhere to, standardization is shaping up with Open RTB adoption and vendors getting "certified" by third-party independent organizations such as the Media Rating Council (MRC) which validate audience measurement methodologies. With this common denominator across all data, marketers can

compare apples to apples and optimize spend accordingly.

Optimization: Fragmentation along channel-specific KPIs and datasets makes finding a common denominator challenging and often steers brands away from the optimal path.

From a decision-making standpoint, understanding cross-channel effects and interactions between marketing tactics is critical to achieving an optimal solution.

Accuracy at scale: Fragmentation across video environments and screens makes it difficult to accurately reach the right people on the right devices at the right time and with the right branded message. Exposing the branded message to enough people such that positive brand impact is generated (i.e. reaching scale) is equally difficult. Marketers' need to find the right balance between accuracy and scale is tricky, especially in the context of growing privacy concerns about how data is tracked, stored and used for marketing purposes.

Realizing the value of cross-screen technology

Cross-screen technology innovation continues to drive massive benefits for marketers. A closer look at the value of cross screen technology reveals five key benefits:

Holistic view of the consumer: As the number of connected and addressable screens continues to grow, extending to other aspects of life—smart homes, smart gyms, smart cars and smart stores—identities associated with each person become ever more complex and data rich. A universal identity management solution helps create a link between siloed data sets combining them to get a more complete picture of the customer. In turn, marketers benefit from the augmented dataset, to make better decisions about how to maximize brand performance.

Increased ROI: Cross-screen frequency capping helps marketers reduce waste associated with unwanted impressions. It also helps minimize negative user sentiment that would otherwise result from overexposure. Moreover, feeding the frequency data back into the decision engine and correlating it with brand performance KPIs can yield even higher ROIs for brands.

Extended audience reach: Marketers translate audiences across screens, extending reach and frequency across all identities (e.g. from desktop across to mobile and vice-versa). It can also help extend first party advertiser CRM data into digital, while deduping users when maximizing reach across channels resulting in increased control over reach and frequency.

Global planning: Cross-screen planning tools bring rigor and intelligence into planning, adding more science to the art. As a multi-channel marketer, pick the right vendor, decide on channel specific tactics, pick the channel specific KPIs to optimize towards, understand uncertainties and prepare for them. The software can aid factor in cross-channel effects and interactions when forecasting key brand metrics such as reach, frequency, awareness, recall, etc. and also enable optimization towards global KPIs instead of local, channel specific ones.

Increased ad influence: Sequencing in cross-screen technology enhances tactics by overlaying multiple types of touch points at different times for the same user in a sequence that yields greater ad influence. For example, a film production company may expect to see an increase in lift in offline movie tickets sales by running branded video ads on desktop throughout the week and then tapping into mobile with a coupon on weekend nights. Cross-channel, cross-device sequencing followed by a call to action can help drive better results for brand advertisers.

As cross-screen technology advances, marketers will continue to find new ways to create value for brand advertising. ■



Stephanie Gaines started her career as a literary agent in Los Angeles, then segued into producing (A Town Without Christmas), media planning and ratings strategy, as well as igniting marketing and content relationships with CE manufacturers, cable operators and tech firms. In Silicon Valley, Gaines has worked with companies including Technicolor and PubMatic. At Yume, she is responsible for press, events, research and messaging for YuMe's nearly 20 worldwide offices.

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Network DVR: The Better Alternative to Cord-Cutting and OTT

Over the next few years, nDVR is expected to play an increasingly large role in cable operator strategies

By Eric Hybertson, VP Product Development, Evolution Digital



Abstract: Network DVR is the latest evolution in recording programs for time-shifted viewing. As cable subscribers have the option to access and stream their stored programming from an IP-enabled device over an internet connection, viewers are increasingly able to move away from in-home standalone DVR equipment. This piece examines the future of network DVR for cable operators, the benefits of “network” DVR over “cloud” DVR, how nDVR has gained traction and what the future looks like for DVR capabilities.

Network DVR (nDVR) is the latest evolution in recording TV shows for time-shifted viewing. Recordable VHS tapes and VCRs gave way to stand alone DVRs, such as TiVo, as well as set-top boxes with DVR functionality from MVPDs. Now cable subscribers have the option to access and stream their stored programming from a remote storage location to virtually any IP-enabled device over an internet connection.

The state of the nDVR market in 2016

First, it is important to define our terms. nDVR is often called “cloud DVR,” indicating that content has been moved from a physical device in the home to a remote storage location. But rather than rely on the inefficiencies of the open internet to deliver content to the subscriber, Evolution Digital recommends deploying a network DVR solution, whereby the storage location is within the closed network of a cable operator’s CDN and managed through a private back office solution. While cloud DVR is

a good idea in theory, it is not practical when delivering high demand, high interest content over the public internet. Cloud DVR is implemented in virtual MVPD streaming services, such as Sling TV and PlayStation Vue, which have struggled with quality of service issues in recent months.

By moving nDVR away from the built-in storage of an STB hard drive, but still in the MVPD private network, operators and their managed service provider partners can remove some of the hassles of CPE maintenance and storage space. Most notably, nDVR solutions don’t require the use of large, stand-alone in-home devices; rather, nDVR is enabled by the deployment of low-cost, compact set-top boxes without local storage. The change from legacy DVR to nDVR is similar to the larger shift to network computing services, largely for purposes of convenience (for customers) and also cost-effectiveness and future-proofing (for operators).

MVPDs in the U.S. and around the world have embraced nDVR as a way to reduce operational costs while still delighting customers with the same DVR features. Customers are now able to use smaller, quieter set-top boxes than the previous models with spinning hard drives inside. MVPDs have kept internet connectivity costs down for nDVR by keeping the nDVR storage and streaming components on their private networks, as well as distributed throughout the MVPD’s access network.

How we got there: Tracing the evolution of nDVR

It has been more than a decade since the concept of the nDVR first really gained traction with a pioneering offering from Cablevision in 2006. Its take on nDVR allowed for networked storage, but eventually became the subject of litigation over whether it violated copyright law. A court ultimately ruled that nDVRs were lawful as long as they created

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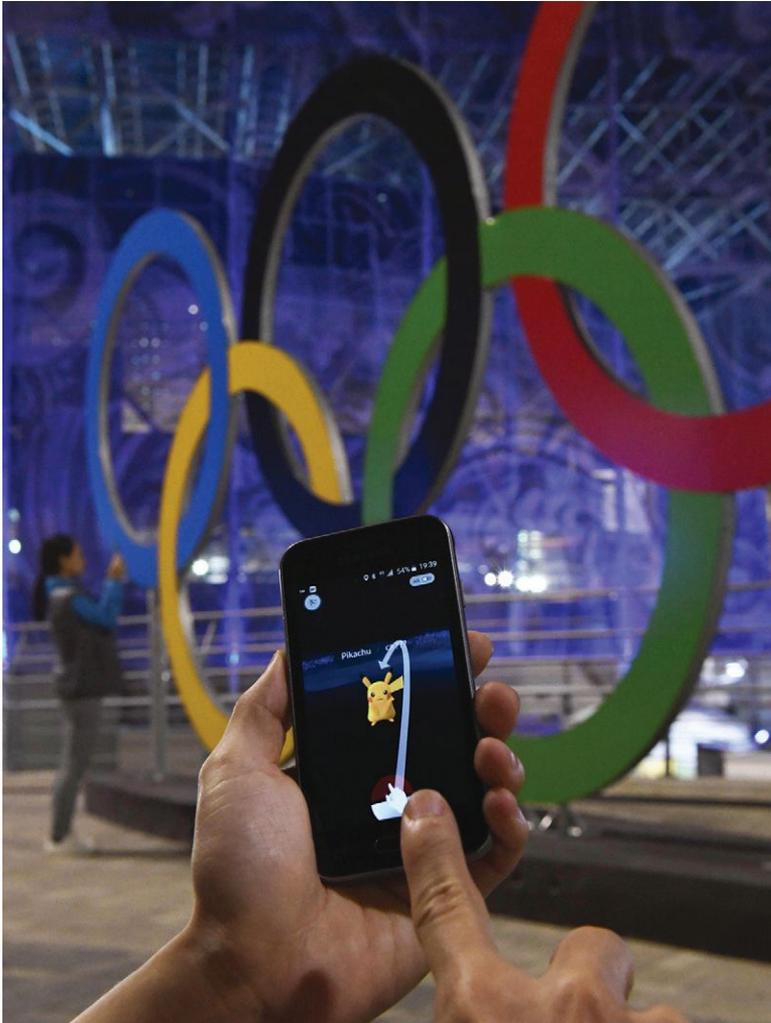
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The Growing Necessity for Cross-Screen Technology

Addressing fragmentation is key to minimize its impact

By Stephanie Gaines, VP Corporate Marketing, YuMe



Abstract: In an era when consumers move dynamically and fluidly throughout their day consuming content and video on whatever device is most convenient to them, it's important that marketers implement campaigns that are capable of reaching audiences cross-screen and at scale.

As NBC has shared, the network sold \$1 billion in ads for the Summer Olympics in Rio de Janeiro, a combined total that includes national broadcast, cable and digital ad sales. The ability to reach massive audiences on a global scale has been long held as a key advantage for any Olympic sporting event, but as advertisers make plans to maximize the opportunity, there is no question that digital has become a core component of media planning for the event.

This is a direct reflection of a massive cultural shift in the way in which sporting events — and content in general — are viewed across myriad devices. This is the era of the liquid audience, one in which consumers move dynamically and fluidly throughout their day consuming content and video on whatever device is most convenient to them, from the TV at home, to the laptop at work, and smartphones and tablets on the go.

So, how do you reach this liquid audience cross-screen, and overcome any inherent fragmentation challenges? It's important that marketers first understand the dimensions of content, screen, data and technology that need to be addressed in order to implement campaigns that are capable of reaching audiences cross-screen and at scale.

Content: In the past two decades, it has become cheaper to produce and easier to distribute video content, which has served to increase fragmentation exponentially. With hundreds of channels to choose from on cable subscriptions, thousands more websites to choose from online and apps on mobile screens, it's a viewer's paradise and a marketer's headache.

Screen: It is now common place for the average person to use multiple devices to access video content, often "dual-screening" by watching a game or show on their TV while browsing content on their mobile device.

Data: Content is viewed on apps and in browsers, on smartphones, tablets and smart TVs as well as on different operating systems and device manufacturers. Thus, collecting data about video consumption has become substantially more complex. Unifying data across all sources to reveal actionable insights is key to evolving a brand's success in a heavily fragmented digital environment.

Technology: Although new technologies enable easy creation and consumption of video content at scale through platforms such as Netflix, YouTube or Roku, technology fragmentation has made it harder for marketers to distribute video branded messages, as well as collect and process data that can later be used to optimize media strategy.

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Real-Time Security For Dailies, Rough Cuts and Pre-Release Content. Now With Content Armor Forensic Watermarking.

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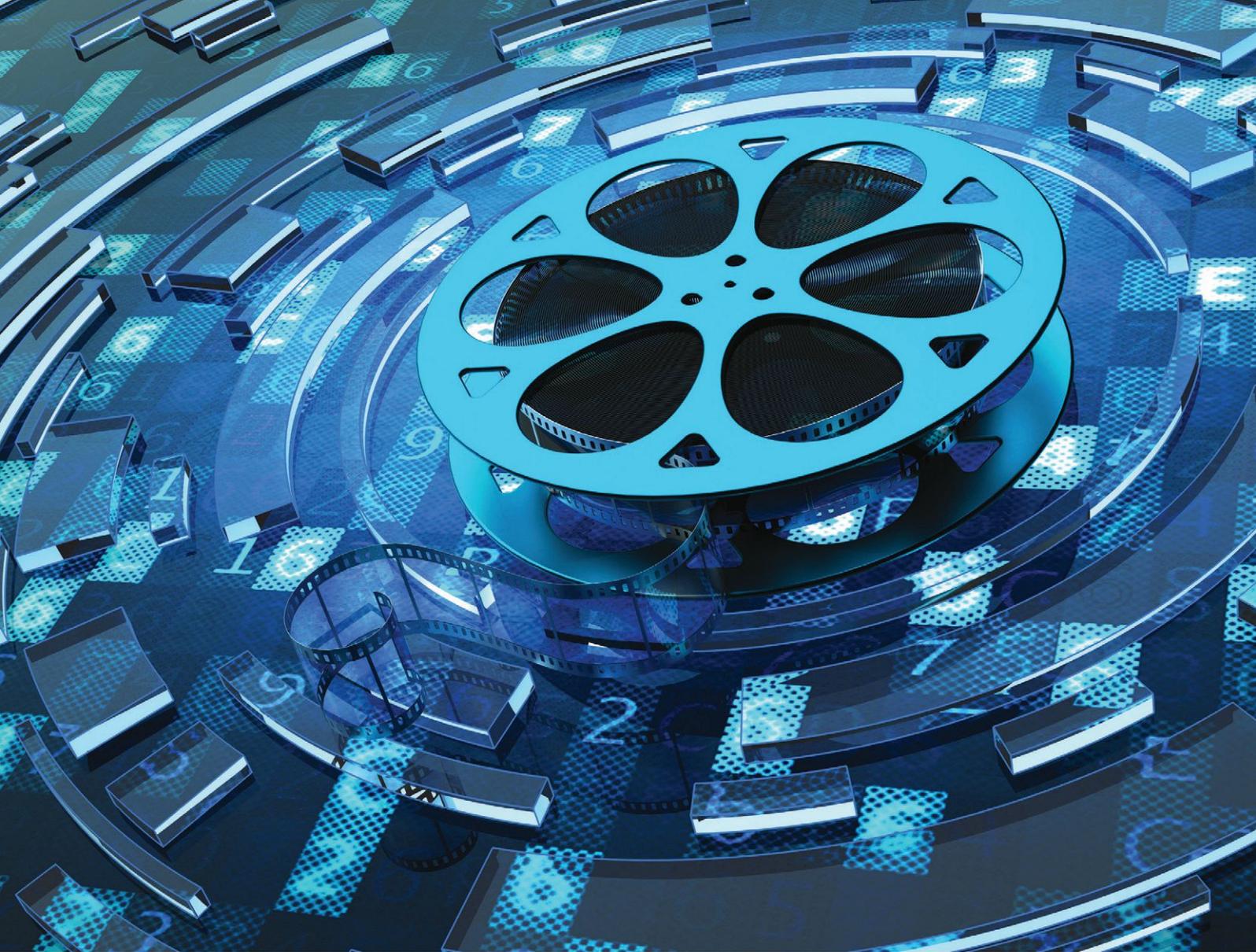
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