



2017 Entertainment Technology in the Connected Age Looks at the Future of Connected Content

By Tom Coughlin

The SMPTE Entertainment Technology in the Connected Age (ETCA) Conference was held on 8-9 May 2017 at the Microsoft Campus in Mountain View, CA. As stated in the conference abstract: The convergence of connectivity, bandwidth, and technology continues to expand entertainment distribution options to the living room, mobile, and beyond. Broadband, Wi-Fi, and mobile networks are now beginning to leapfrog traditional distribution mechanisms, because of the rapid pace of innovation and performance improvements, the flexibility of consumer options, and the ability to upgrade with a software download. The concept of this conference is to examine the present

and explore the future in the context of the emerging technologies and services for delivering a compelling connected entertainment experience. This two-day event at the Microsoft Campus in the heart of Silicon Valley explored how the connected world is changing entertainment and providing actionable understanding of technology and application trends. At the end of the first and second day Wendy Aylsworth, chief executive officer (CEO) of Walden Pond and SMPTE Fellow gave the day's wrap-up and take-away discussion with the attendees and the moderators from that day's sessions.

Following are some notes on the two-day event.

8 May 2017

Rethinking Content Creation and Monetization in a Connected Age featured speakers from

Perspective Media Group, Karen Painter, head of media software and Services at Turner Broadcasting System Inc., Renard Jenkins, vice president of PBS Operations; Allan McLennan president and founder of the PADEM Media Group and



Wendy Aylsworth



Panelists (L-R): Zane Vella, Karen Painter, Renard Jenkins, and Allan McLennan.



Janet Gardner

Zane Vella vice president of product at Comcast. The session was moderated by Janet Gardner president of the Perspective Media Group. The participants represented a number of distribution channels with lots of content assets. Consumers take the availability of content on the web for granted. They expect faster response from media delivery. The panelists discussed ways to make money in an age when much content is available for free. These included content streams without advertising for paying members and paying attention to the interests and needs of fans of an asset in advertising insertions. The use of SMPTE standards was discussed. Carrying a single ID and time stamp in a signal is a major factor in digital exploitation. Also, out-of-band metadata could be an important element in monetization. Programmers need tools to create chapters in their content so programs can be segmented and syndicated with the underlying video asset—standards will help.

Linear Playout: From Cable to the Cloud featured Thomas Edwards, vice president of engineering and development for Fox Networks Engineering and Operations; John Honeycutt chief technology officer (CTO) at Discovery Communications; Larry Kaplan president and CEO at SDVI and

Usman Shakeel, worldwide technology leader at Amazon Web Services. The session was moderated by Peter Wharton vice president of technology at BroadStream Solutions. For Discovery, their use of the cloud started from aggregation from traditional physical assets to content in the cloud. Payout was one of their key purposes, but they also sought to deal with nonlinear assets via a distributed supply chain. Fox's 2020 strategy seeks to use an object-based assembly of assets as far downstream in the production process as possible for various versions of content. Fox uses AWS video cloud distribution with 200 Fox affiliates. It is easy to experiment on the cloud and, ultimately, some assets will be on and some off-premise. AWS has teamed with SDVI and Fox to make their work more efficient. There was mention of building a server-less media supply chain. Ultimately, the biggest benefit is when all the assets and work is done in the cloud, as AWS sees it.

Keynote Talk: At the Edge: The Future of Entertainment Carriage

Bob De Haven of Microsoft gave a keynote speech. He said a lot of disintermediation was going on in the industry. He referenced the writing of Thomas Friedman,

particularly his book, "Thank You for Being Late: An Optimist's Guide to Thriving in the Age of Accelerations." Businesses without a well-architected cloud strategy will be short-lived. He also mentioned Thomas Davenport's book, "The Attention Economy." Attention is the scarcest entity in today's world. He stated that people have a limited amount of attention during a day. If we are paying attention to one thing, we can't pay full attention to other things. Microsoft has created privacy rules for all content in the cloud. There are 38 Azure regions, including China—more than AWS and Google combined. They have been building this out since 2009. Avid signed with Azure the week before the conference. New metrics are needed for business, and there are new areas for monetization. Verizon Edgecast is created around the Azure stack. Verizon's global networks have 20 Tbits/sec network capacity. Using Edgecast takes three clicks to enable a CDN from Azure. Avid has created a digital media blockchain. Many problems in the future will be solved by multiple companies working together.

Weather Forecast: Clouds and Partly-Scattered Fog in Your Future looked at the role of local networks in future content creation and delivery. With the growth of



Morris Novello

connected smart devices, often called the Internet of Things, automated factories and connected cars, local networks, often called the Fog will play a great role in many operations, including the movement of media. Morris Novello, senior director of marketing at Nebbiolo Technologies and Chunming Rong, chair of the IEEE Cloud Computing Initiative spoke in this session, which was moderated by Tom Coughlin, president of Coughlin Associates. Novello looked at how local fog networks are used to coordinate activities in factories and to provide communication and coordination of connected vehicles. Rong discussed

different ways that computer devices can be connected, including local, decentralized networks. His examples included smart home gateways and smart meters. He also talked about the use of encryption to protect information and the requirements of the European General Data Protection Regulation (GDPR) that must be adopted by cloud providers by 2018. Local fog networks can be used to provide local distribution of content. If the content is cached at the edge, local networks may provide higher content bit rates and higher quality media experiences. The NIST Cloud architecture now includes accountability to privacy

standards. This background led to an informed discussion of the role that local networks will play in content distribution.

Would the Internet Crash if Everyone Watched the Super Bowl Online featured Tony Emerson, managing director, Worldwide Media and Cable at Microsoft; Jason Friedlander, director of marketing communications from Verizon Digital Media Services; Ed Haslam, chief marketing officer at Conviva and Dan Sahar, vice president product marketing at Qwilt. Colin Dixon, founder and chief analyst at nScreenMedia, moderated the session, which looked at the capability



Chunming Rong





Jason Friedlander



Pancrazio Auteri



Hanno Basse

of networks to handle realistic traffic loads. The Super Bowl required about 4.5 Tbits/sec total delivery through existing networks. Buffering content is an essential element in maintaining good quality of service (QoS) delivery. Other approaches that have improved overall system performance during high-traffic times include multicast streaming, peer-assisted delivery and User Datagram Protocol (UDP) streaming.

Is There a JND In It for Me looked at developments in display technology, discussing what the real parameters are to define a Just Noticeable Difference (JND) in the user image quality experience. The session included Timo Kunkel, staff researcher at Dolby Laboratories, Inc., and Sean McCarthy, an independent consultant with ARRIS. Charlie Jablonski, CEO at Susfugo and SMPTE Past President, moderated the session. Of course, there are much subjective as well as measurable factors in user image perception. There is also the artistic intent of the content creator to take into account how an image is displayed. Creating the best display technology for the price involves user perceptions, content creator intentions, and the available technology at a price that consumers can afford.

9 May 2017

Giving Voice to Video Discovery featured Pancrazio Auteri, CTO at Content Wise; David Kulczar, senior offering manager at IBM Cloud Video; Christy Martin, founder of iBox Systems; and Cory O’Conner, product manager for the Android TV platform at Google. The session, moderated by Colin Dixon, founder and chief analyst with nScreenMedia, explored the implications of using artificial intelligence voice recognition agents on popular home content gateways, including Alexa, Google Home, and Apple’s Siri. These agents are used for accessing video and other content. Users often expect that they will communicate with these agents in a conversational manner, similar to the way they talk with each other. The session explored the implications for these voice-based interfaces now and in the future. It also explored the sort of content metadata that needs to be associated with video content for an AI agent to respond to the variety of questions that consumers might ask. The total metadata requirements are potentially large, and data capture from content using manual and automated metadata generation will drive more ways to connect with the content (and second-screen experiences with that content) that consumers are seeking.

Adaptive Streaming Technology: Entertainment Plumbing for the Web included Iraj Sodagar, principle multimedia architect at Microsoft and Josh Tidsbury, media technology evangelist from Apple. The panel session was moderated by Jim Burger, partner at Thompson Coburn LLP. Because of variable network bandwidth to consumers, entertainment streams are encoded (sometimes on the fly) in multiple bit rates that can be adjusted to try and maintain QoS during varying network traffic congestion. MPEG-DASH (Dynamic Adaptive Streaming over HTTP) is an adaptive bitrate streaming technique to enable more accurate streaming of high-quality video over the internet using conventional web servers. Apple has its own similar service HTTP Live Streaming (HLS). DASH breaks the content into a sequence of smaller HTTP-based file segments. This is available in a variety of bitrates. The client automatically selects from the various alternatives the next segment to download and play, depending on current network conditions.

Keynote Talk: Next-Generation Entertainment: A View from the Fox

Hanno Basse from 20th Century Fox talked about a variety of topics, particularly virtual reality (VR). He

asked whether VR is a storytelling medium. Can VR be a true linear narrative rather than an interactive play media? Can VR be an emotional rather than just a visceral presentation experience—can VR be subtle and create active involvement; will it work if it is or is it just an escapism media? One of the issues is where and how to direct the viewer's attention. The current approaches don't seem natural yet. Basse said he believes that VR is great for short form content, such as promotional experiences. "Alien in Utero" was one example. "Martian 360" video experience was another. Interactive VR's 6-degrees of freedom provides a natural interaction, similar to real life and provides the potential for hours-long engagement (if comfort can be maintained). VR offers the possibilities of multiple stories with activities at many levels and with variable narrative bridge content. It can be a multiplayer experience at room and beyond scale. However, current implementations have limited device portability, reality gets in the way (literally). Augmented reality (AR) where content can be overlaid on top of another view—for instance, real life may be a more portable media. He wanted to know the killer app for AR. Google glass ran into issues with privacy. Could AR in glasses replace flat screen devices? Could it be part of entertainment? AI and Machine Learning could be useful additions to entertainment experiences for non-player characters to create more natural actions. He suggested looking at AlphaGo—an AI version of the board game Go to see the capabilities of AI.

IP and Three: What's New in 2017 featured Kevin Gage, executive vice president of strategic development and CTO at ONE Media LLC; Steve Reynolds, CTO of Imagine Communications; Anne Schell, managing director of Pearl TV and Kent Walter, vice president of technology at Qualcomm Inc. Gordon Castle, vice president

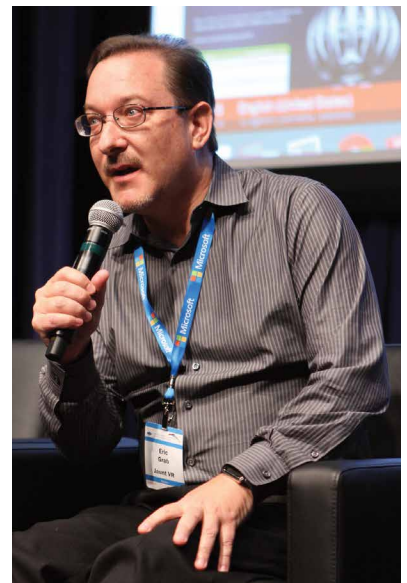
and head of strategy development, media, IoT and Applications at Ericsson, moderated the session. ATSC 3.0 holds immense promise for base core service and new business models as spectrum becomes available. The move to use SMPTE standards to create content with IP gear—works better for distribution to all IP downstream environments, allowing more native IP flow from end to end. These standards must support legacy as well as new distribution technologies. MPEG-DASH can be used to push data across one system. Manifest-based content is easier to work with using all-IP. ATSC 3.0 gives flow-through if MPEG-DASH is used. Unlimited data also allows more viewing of video. In the discussion, panelists mentioned that baby boomers have little interest in mobile viewing, whereas, millennials want free over-the-air combined with everything else for one viewing experience. Many millennials said they would cut the cord and get an antenna. Session participants saw over-the-top (OTT) skinny bundles being the most popular offerings for content delivery. There now are a plethora of these services. Conditional access is needed to allow protecting streams and also enables audience measurement

and paywalls. Most companies are moving toward the SMPTE 2010 spec, including Evertz. Millennials now have more spending power than baby boomers—they should be the target audience—and they have different needs from the older generation.

VR From Fiction to Fact included participants Eric Grab vice president of software engineering at Jaunt VR; James Jensen, chief visionary officer at THE VOID; William Jiang, engineering director at Lytro and Michael Schmier, vice president of content and services at Samsung Electronics America. Hari Lakshman, senior research architect, technology Incubation Group at Dolby Laboratories Inc., moderated the session, which explored emerging uses of mobile as well as PC-based VR experiences. It also looked at the challenges of making and streaming VR content, which can require transmitting large amounts of data at high data rates. There are also efforts to create VR interoperability standards as part of the MPEG standard. Technologies for capturing 360-degree content have advanced significantly, and the software to combine the content from these multiple camera rigs have made great strides, although some challenges remain.



Anne Schell



Eric Grab

This process can take a considerable amount of time today, but will be much faster in the future as processing power increases. VR experiences are now mostly short form, but there are projects under way to create early long-form content. Creating stories using VR has unique challenges. Drawing the attention to a viewer to action in one location in a natural way is still being developed. Perhaps VR could include many stories depending upon which view is taken—how complicated could this be and could this be done only with single viewers, or with multiviewer environments as well?

Video Compression: What's Beyond HEVC included Jill Boyce, Intel Fellow and chief media architect at Intel Corp.; Walt Husak, director of image technologies at Dolby Laboratories Inc.; Derek Pang, video architect at Lytro; Gary Sullivan, co-chair of the JVET of

ISO/IEC MPEG and ITU-T VCEG at Microsoft and Yan Ye, director of engineering at InterDigital Communications. Mike DeValue, director of technology standards and strategy at The Walt Disney Studios moderated the session. There is new work on Joint Video Exploration Team (JVET). A new generation of compression technology is faster than HEVC (used to be 15-year intervals between new compression technology generations, but this is shorter now). There is preliminary work on this standard, with six meetings to date. The current version JEM on 6 April 2017. There are varying trade-offs of compression versus complexity. Preliminary results show 30% compression gain. A 10X complexity (process time) increase is needed to achieve these results. There is a call for working cases related to these standards—perhaps focusing on 4K, high dynamic range

(HDR) and 360-degree omnidirectional content. There will be a call for proposals by October 2017. The new standard target is late 2020. There are new JPEG standards. JPEG 1 is the most popular standard (ratified in '87, last revision in '89). JPEG 2000—digital cinema app and mastering will likely be replaced by JPEG XT, which was ratified in 2016. JPEG 1 is underlying SDR. JPEG XS is designed for mezzanine coding, for use internal to facilities. JPEG PLENO is designed for a number of different formats. Some of these are volumetric formats, photogrammetry, etc. The goal of these standards is to support many displays, simplifying the codecs for faster encode and decode. Seeking a simple transcode to and from existing J2K files is an important goal. The next generation of image coding may utilize a planar imaging model.

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