USC School of Cinematic Arts

etc ENTERTAINMENT TECHNOLOGY CENTER

Spring/Summer

A MESSAGE FROM THE EXECUTIVE DIRECTOR

The past two quarters have been full of engaging programming and exciting announcements here at ETC.

Our recent work addresses the industry's most interesting and vexing problems, including the state of adaptive production, cloud-based post production, content archiving, blockchain technology for the media and entertainment industry, VR/AR, big data and analytics, machine learning/AI, smart cities, and the media and commerce opportunities of IoT.

We've launched a new opportunity bringing together USC students and our member companies in an Immersive Media Challenge, a competition imaging future experiences. Our Digital Town Square focused on the emergence of 5G and its impact on the industry. We had some press in the *LA Times* and a *Forbes* video feature, "AI Goes to the Movies" with AI & Neuroscience in Media Director, Yves Bergquist. ETC at NAB this year programmed Cloud Production, Archiving and Quantum Computing sessions.

Finally, congratulations to Michael Wise, ETC's newly-elected board chairman and Leon Silverman, recipient of this year's Bob Lambert Technology Leadership Award.

-- Ken Williams

ETC Quarterly   Spring/Summer 2019

ETC Selects Four Projects In Its Inaugural Immersive Media Challenge

This past spring, ETC invited students and recent grads to participate in its first Immersive Media Challenge, organized by ETC's Director of Immersive Media Phil Lelyveld and funded by NBCUniversal and Cisco. The competition required students to ideate an engaging experience in one or more of these areas:

CITY PLAY · **FOR FUN** · **FOR GOOD** · **FOR HEALTH**

Four winning entries were selected to continue developing a proof-of-concept over the summer: *Viewfinder*, an emotion-reactive creature-based exploration puzzle game created by Erin Reynolds; *placeLA*, a multilingual data visualization and social media tool that promotes civic engagement in local neighborhoods created by Melina Castorillo; *Lumeum*, a VR experience that aids the aging population to remain socially connected, physically active, and mentally stimulated, Max Orozco, creator; and *The Museum of Romance,* by Xinwen Chen, provides personalized romantic experiences across cultures and scenarios using VR, AI, haptics, and motion capture. Congratulations to this talented group of students and recent graduates!

ETC Names New Board Chair: Michael Wise, CTO, Universal Filmed Entertainment Group

Michael Wise, Chief Technology Officer, Universal Filmed Entertainment Group, was announced as ETC's new Executive Board Chairman at the annual Studio Technology Leaders Dinner at USC's Town & Gown. Ken Williams congratulated Michael on his new leadship position, noting "we are thrilled that Michael has agreed to serve in this new capacity as Chair."

Wise, who leads the development and execution of a comprehensive technology strategy for Universal Pictures and is responsible for the day-to-day delivery of all technology initiatives and operations in support of the studio, has been a member of ETC's executive board for the past four years since coming to Universal Pictures.

Wise commented, "I'm honored to chair the ETC, and along with my fellow board members, I look forward to creating opportunities for our industry at a time when rapid advances in technology continue to drive unprecedented innovation in how we create and tell stories."

Wise replaces Hanno Basse, President, Decentralized Media Infrastructure, Live Planet and former CTO, Fox Filmed Entertaiment who served as ETC chair since 2016.
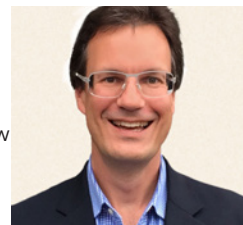
Convene

ETC enjoys a long-standing history as a neutral think tank and research center within USC's School of Cinematic Arts that convenes executives, innovators, thought leaders and catalysts. Part of the ETC mission is to convene industry peer groups and partners to share knowledge and experience.

5G: The Next Wave of Media Transformation
an ETC Digital Town Square

ETC hosted a half-day forum on 5G on March 28, 2019 at the Haworth Furniture Penthouse Showroom in Downtown Los Angeles.

The advent of 5G technologies is poised to transform entertainment supply chain, workflows, Hollywood enterprise relationships, and the very nature of content. Through explorative talks, panels, and presentations, we examined 5G's transformative prospects for content creation, distribution, and consumption, along with its potential to disrupt traditional Hollywood business models.

Attendees included professionals ranging from production executives, business strategists, and senior technologists from the consumer electronics industry.

Presenters/Topics:

Getting up to Speed with 5G
Bhaskar Krishnamachari, Prof./Ming Hsieh Faculty Fellow in Electrical Engineering, USC Viterbi

Operating on the Edge
Pete Bernard, Principal Group Program Manager, Strategy and Ecosystems, Microsoft
Will Pressly, Senior Director of Engineering, Verizon
Winston Caldwell, VP Spectrum & Advanced Engineering, Fox Broadcast (Moderator)

New Frontiers in Immersive Entertainment
Per Karlsson, Director, Digital Representation & Interaction Research, Ericsson
Greg Gewickey, VP, Emerging Technology, WarnerMedia
Flint Dille, Creative Lead, Niantic
Anshel Sag, Analyst, Moor Insights (Moderator)

How Can Wireless Broadband Remake Production?
Michael Davies, SVP, Field Operations, Fox Sports
Ben Havey, VP, Technology Innovation Group, Walt Disney Productions
Mariah Scott, President, Skyward
Michael Chambliss, Advanced Production Technology Specialist, ICG (Moderator)

5G: The Potential vs. The Reality
Hanno Basse, CTO, 20th Century Fox Film Corp
Peter Linder, Head of 5G Marketing, North America, Ericsson
Wayne Purboo, SVP, Strategy and Business Development, AT&T
Jake Sally, Head of Immersive Development, RYOT
Jonathan Wood, Senior Director Ecosystem and Business Development Advanced Technologies Group, Intel
Spencer Stephens, President, TechXMedia (Moderator)

Hollywood Technology Execs Gather at Annual ETC Dinner

ETC held it's 8th annual Studio Technology Leaders Dinner on June 26th, underwritten by supporting sponsor Equinix and contributing sponsor, WekaIO. We honored industry leader Leon Silverman with the Bob Lambert Technology Leadership Award and held a panel addressing some of the industry's most pressing issues.

Along with reporting on ETC's current projects, Executive Director Ken Williams announced plans to " launch another track on 5G enablement in the next year."

Equinix Chief Executive Charles Meyers also addressed the attendees: "The architecture of choice is emerging and it has a logical home – the digital edge," he said. "You make us better at what we do."

The concluding industry panel "Media Fundamentals in Flex: Conflict, Chaos or Collaboration," moderated by Ken Williams, invited industry experts -- Bill Baggelaar, SVP, Technology, Sony; Bob Eicholz, CTO, Technicolor; Anthony Guarino, EVP, WW Technical Operations, Paramount; Justin Herz, EVP, Digital Product, Platform & Strategy, WB; Hugo Latapie, CTO, NDS, Cisco; Mark Miller, Sr. Director, Azure M&E, Microsoft; Jamie Voris, CTO, Disney Studios; & Michael Wise, CTO, Universal -- to discuss salient topics such as the growing impact of massive amounts of data,

transformative cloud technology, game engines in virtual production, transforming distribution models in the age of subscription streaming, and an initiative to demystify technology to spark greater adoption. Williams concluded. "Don't forget you can take risks in a university setting and learn from both your successes and failures. The ETC represents a low-cost environment for fast prototyping and experimentation. I encourage you to spend time with ETC – we can chip away at some of these problems together."

Leon Silverman of Netflix Receives The Bob Lambert Technology Leadership Award

The ETC honored Leon Silverman with the Bob Lambert Technology Leadership Award at its Studio Technology Leaders Dinner on June 26th. Director of Post Production Operations and Creative Services at Netflix, Silverman is a 40+ year industry veteran who previously held important roles at Disney, LaserPacific, Eastman Kodak and Compact Video. He has been a leader of HPA, which honored him with

its Lifetime Achievement Award, has won two Emmys and holds five patents. Paramount Pictures' alum Garrett Smith, former Disney/ABC Television Group's Vince Roberts and HPA President Seth Hallen lauded Silverman, who called himself "uncharacteristically speechless."

"Thanks to all the people in this room and so many other people in my life who have mentored me, taught me, challenged me, supported me, especially my wife Suzanne, my partner and rock," he said, also acknowledging Dean Elizabeth Daley's "visionary guidance, Ken [Williams'] leadership of the ETC and the continuity and smiling face of ETC, Edie Meadows."

Convene

ETC at NAB:
Adaptive Production and AI

Adaptive Production and AI were front and center for ETC@USC at this year's NAB Show on April 10th. Under the NXT Tech Symposium, 3 sessions programmed by our Adaptive Production Director Seth Levenson discussed current state, findings, and perspectives.

QUANTUM COMPUTING

This session covered how quantum computing's application will impact the industry. Led by ETC's Director of AI & Neuroscience in Media Yves Bergquist; ETC's Director, Adaptive Production Seth Levenson; USC Viterbi's PhD, Quantum Information Bibek Pokharel; and IBM Research VP & Lab Director Jeff Welser, the session broke down the basics of a complex new avenue in entertainment technology.

Although it presents hardware design restrictions and is error-prone, quantum computing offers a level of computing power far beyond anything we've seen. It can benefit everything from cryptography to artificial intelligence, and be used to create new medicines or simulate materials.

Pokharel described qubits (quantum bits) and properties of quantum entaglement capable of "an exponential increase" in computing power. Currently there is a race to achieve the quantum advantage. "Billions of dollars are being invested in this," said Welser. Bergquist posed the question of whether quantum computing can accelerate the development of artificial intelligence, and noted "it's a statistician's dream. It can do the kind of work DeepMind was doing, but more efficiently, so quantum computing could help us a lot."

PRESERVATION IN THE CLOUD

Providing background and context, SVP of Archiving at Paramount Pictures, Andrea Kalas, co-chair of ETC's Adaptive Production Archiving subcommittee, outlined preservation's timeline and the concepts and approaches that have changed especially with the migration from analog to digital technology. She noted a number of the groups, activities and organizations currently working in this area and described the technology of "fixity" which represents, "in many ways, the most granular level of intellectual property to protect and it's critical importance to digital preservation." "The work we are trying to address," she said, "is to provide good gudiance to our peers about how to preserve in the best possible way."

Denis Leconte, VP of Technology at the Iron Mountain Entertainment Group, explained the mechanics of content preservation. Leconte broke down the conversion between physical and digital assets, and how these "migration engagements" of large amounts of data is a highly collaborative process, attempting to make content as reusable as possible. Among operational challenges are sourcing outdated equipment, developing efficient search functions, and maintaining overall affordability.

Adam Skewgar, Director of M&E for Microsoft Azure, presented on content management within the context to Microsoft's in-house cloud-computing service. Skewgar discussed what the company offers in terms of cloud services, including faster access times (efficiency) and geo-redundant storage (durability). Skewgar also touched upon the transparency of the work being done at ETC: "You know we're doing what we say we're doing."

PRODUCTION IN THE CLOUD

During this panel, Equinix, Google and Wasabi execs described their cloud-based solutions, and a client from Technicolor described the pitfalls of a cloud service.

Google M&E Cloud Solutions Architect Adrian Graham noted, "media production is an increasingly global enterprise. Studios need to be able to open up wherever the incentives are."

Wasabi Technologies Head of Product Jim Donovan announced the launch of the Media Innovation Cloud Alliance. "The challenge of working with independent vendors is to make sure they work together," he said. "We want to make it possible to leverage the power of these vendors without paying a penalty."

Technicolor Chief Technology Officer Bob Eicholz stated, "We'd like to eliminate a lot of the hardware we have and be creative … global cloud collaboration is well underway." But, he added, "In the cloud, if you don't manage it appropriately – which is difficult to do – your costs can blow your budget."

From Records to Knowledge: What's Coming Next in AI-Powered Metadata

In a June 3 event, ETC's AI & Neuroscience in Media project laid out how advances in the past few years of machine learning would impact how metadata is being extracted and indexed in media content. Yves Bergquist, Director of the project, introduced the topic by laying out how the landscape for academic and industry research around artificial intelligence and machine learning stood very far ahead of its current industry applications. This is especially true for processing unstructured data like media content, where, according to Bergquist, advances in unsupervised and mixed machine learning models are showing a lot of promise to extract amounts and types of metadata that are above and beyond current industry standards. As an example, Bergquist described

AI at ETC – In the Media

Helmed by ETC's own AI researcher and data scientist Yves Bergquist, the 'AI and Machine Learning in Media' project at USC has been producing white papers and deliverables that have been featured in a few media outlets.

Los Angeles Times

In an April 11, 2019 article by Wendy Lee, the notable publication detailed the serious new possibilities of machine learning to contribute to scriptwriting and intuitive content production.

Lee cites ETC's Executive Director Ken Williams in introducing the disruptive new idea of artificial intelligence in the creative space: "These are tools that enable us to make smarter decisions... You have this sort of Armageddon type of response to the Orwellian implications of computers ruling the world. People get very fearful of any kind of automation, especially artificial intelligence." The changing tide is wrought by the recognition that there is simply too much data for a normal human being to sift through to analyze marketabliity.

The article also reported ETC's presentation demonstrating correlations between a film's plot structure and global box office performance. Lee specifically cited the example: "Films that led with action sequences, like the robbery in 2008's 'The Dark Knight' or a battle in 2010's 'How To Train Your Dragon,' did more than 13 times better at the box office on average than films that started with memory sequences."

"We're not telling anyone what to make," Williams said. "Maybe we're saying there is a smaller audience statistically for this kind of movie and if you want to make this movie, maybe make it a little less expensively."

Forbes

In a video feature called "AI Goes to the Movies," ETC's Yves Berquist examines how studios may use AI to "drive decisions and better understand their audiences." This was included in the sixth issue of *Forbes'* series on AI wherein Forbes Insights partnered with Intel to source industry leaders, identifying trends and showcasing research in order to provide a "360-degree look at artificial intelligence."

Bergquist opens, "The story is not just an object, it's a process happening in the brain to compress the enormous complexity of the world around us into a very elegant representation of that world." Bergquist explains that the work being done at ETC aims to divulge the cognitive relationships that people have with stories.

With AI and machine learning, ETC is building what Bergquist calls "granular models of human behavior." The work this technology does elucidates relationships between consumer behavior and content assets such as emotional tonalities or particular plot points. The data analyzed includes more than just box office performance – the models also account for audience conversations and even contextual data such as weather, traffic, and macroeconomic data.

ETC Contributors & Staff:
Robert Scott, Editor
Debra Kaufman, Writer
Jessica Ho, Writer/Editorial Support

Ken Williams, CEO/Executive Director
Yves Bergquist, Director, AI & Neuroscience in Media Project
Phil Lelyveld, Director, Immersive Media Experience Project
Seth Levenson, Director, Adaptive Production Project
Edie Meadows, CAO/Co-Editor
Eileen Zuniga, Administrative Assistant

From Records

ETC's current research and development project, "Vid2Vec", which applies some of the latest machine learning techniques to detect and classify many attributes of video that have not been able to be detected so far, including frame dynamics, musical tonalities, emotional tonalities of characters, and visual styles. Vid2Vec was presented as a machine "grammar" for media content. The presentation was followed by a spirited conversation about the potential applications of these new methods in media and entertainment, including semantic video services, digital asset management and semantic storage and search, as well as content recommendations based on granular attributes of visual narrative.

Perspective

ETC provides insight and perspective on emerging media habits of consumers and understanding of the impact of technology on the consumer experience and the creative process.

USC Students Speak on Media Habits and Consumption

At our June 20th All Members Meeting, ETC@USC invited students to participate in a panel where they voiced their observations of current youth media consumption and to speculate on the future of interactive media. The panel was moderated by ETC's Immersive Media Experience Director Phil Lelyveld. View the highlights here.

In order to engage with industry leaders on these topics, the students drew from observations of their families, analysis of their own personal preferences, and consideration of their academic studies.

Our participating panelists included: Anil Ramakrishna, AI and CS graduate student; Grace Kim, CS and Business Administration student; Divyanshi Sharma, CS graduate student; Nripsuta Saxena, CS graduate student; Maduri Deo, CS and Games student; Earth Kulruchakorn, CS graduate student; and Divya Choudhary, Data Science student.

Where Are They Now? An Interview with Emily Wilson

What did you do at ETC?
I worked as a web story writer at ETC, mostly researching and summarizing articles I thought pertinent to include in the daily email to subscribers.

Did your work at ETC help with your classes at Annenberg?
Absolutely! My experience at ETC helped me stay up-to-date on the many interesting developments happening within the tech/journalism/content space, which was helpful to my education. Specifically, I was studying online journalism at the time, so much of what we talked about in class -- about information distribution channels, content monetization, etc. -- I'd then read and write about for ETC, and vice versa.

How did your experience with ETC prepare you for your positions post-USC? At Metis?
I am 100% sure I would not have landed my first post-USC job without my ETC experience. I was hired as a writer/editor at a video production company that worked with clients in the tech space. The fact that I could write about tech topics of interest to them, and that I had clips to prove it, was huge. I began managing that company's blog and eventually worked up to a Sr. Editor position there. That, in turn, led to my role as Marketing Manager/Sr. Content Editor at Metis, another company that lives in the tech space. Now, I'm a freelance content writer and editor for clients in education, non-profit, tech, and healthcare. I've found a professional space for myself at the intersection of tech and content development, and I consider my time at ETC the beginning of that.

How was your overall experience at ETC?
My experience at ETC was great. The hours were flexible and fit well within my busy graduate student schedule. The topics were of interest and new every day. The coworkers were caring, kind, and super smart. Overall, I'm so grateful I found ETC and that I was given a chance there. I truly believe it was a springboard to where I am now -- and to where I'll continue to go.

Summary:
Emily Wilson graduated from USC's Annenberg School of Journalism and Communications with a Master's degree in Online Journalism in 2012 and is currently freelancing as a content writer and editor based in Columbia, SC.

Past & Upcoming Events

Speaking Engagements

ETC AI & Neuroscience in Media Director Yves Bergquist
- *CinemaCon, April 2019* - AI in Entertainment Panel
- *Media City Bergen, June 2019* - AI in Media Keynote

ETC Immersive Media Experience Director Phil Lelyveld
- *Augmented World Expo, July 2019* -- The Impact of Emerging Technologies on the 2020 Presidential Election (Moderator)
- *Siggraph Business Symposium, July 2019* -- Thinking Like A (f)uturist (Opening Keynote Speaker)
- *Digital Hollywood, November 2019* -- The Immersive Media Think Tank: AR-VR-MR - The Expanding Vision of an Industry (Panelist)

ETC Upcoming Events
- *vETC | The Grand Convergence: Innovation and Integration* - August 27 & 28, 2019
- *Immersive Media Challenge Summer Presentations and Fall Kickoff* - September 5, 2019
- *Digital Town Square* - October 21, 2019

etc ENTERTAINMENT TECHNOLOGY CENTER