



Director's Notebook

Highlights of NAB Digital Cinema Summit 2008



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On April 12th and 13th, SMPTE produced, in association with the Entertainment Technology Center at USC, the NAB Digital Cinema Summit in Las Vegas. This year, as a service to our members, SMPTE embarked on something new—a written compilation of highlights. I've also included a few photos from my personal gallery onsite at NAB. **Enjoy!**



Photos © Mark Foreman

Digital Cinematography: From HD to 4K

It all has to start somewhere, and in digital cinema technology, it starts with the camera. This year's opening session had no shortage of advancements, presented by senior executives from eight leading camera companies: Canon USA, Thomson Grass Valley, Panavision, Arri Media, Sony Corp., RED, Vision Research, and Dalsa. Panel highlights:

- It was the emergence of global standards that propelled digital cinema with such rapidity over the past five years. (Larry Thorpe, National Marketing Executive, Canon USA)
- Digital and film motion picture cameras are not mutually exclusive, as shown by footage from Sony Corp., and comments from several panelists. "It boils down to which camera is right in which setting." (Yasuhiko Mikami, Sr. Manager, Planning Dept., Sony Corp.)
- Arri Media detailed a film-style digital camera, which blends the features of 35mm with those of digital. "There's a future for both. The question is which is right for which project." (Bill Lovell, Managing Director, Arri Media)
- When comparing 35mm single imager cameras with full HD cameras, and other options, "just use them—there is no arguing against emotion." (Peter Centen, Group Leader, R&D, Thomson Grass Valley)
- "Ignore the technical mumbo-jumbo. Look at the pictures on the screen. We're in the dramatic storytelling business—we can evaluate quite well on screen, to see the qualitative differences." (Rob Hummel, President, Dalsa)
- Modularity, particularly for storing acquired images, is a key feature in digital motion cameras. Panavision, which showed a clip of 14 trailers in 4 minutes, introduced a 6-lb, solid-state recorder that docks directly onto the camera. (John Galt, SVP Advanced Digital Imaging, Panavision)
- Digital cameras are memory hungry. Vision Research's Phantom HD camera, capturing at 1920 x 1080 and 1000 frames/sec, consumes 3.8 Gbits/sec; a 16 GB camera holds about 4 seconds of HD recording, at full speed, which takes "about 15 minutes to download." Advancements will be made in workflow management, to move large images around more quickly. (Rick Robinson, Director Marketing, Vision Research, Inc.)



"Plan your shoot and shoot your plan couldn't be more true in 3-D."

Buzz Hayes

Stereoscopic Moviemaking

Depth control is the distinguishing factor for contemporary 3-D images, and thus will propel 3-D beyond "a fad or a theme park or a carnival experience, into a business and production technique for use in the world of feature films," said Steve Schklair, 3ality Digital Systems.

Also, imperfect matching images make bad 3-D—so, from a production perspective, it's important to make perfectly matching, twin images. "Any imperfections get in the way of comfort," said Schklair.

The most complex 3-D material costs about \$75,000/minute to produce; re-doing material created previously is in the \$55,000/minute cost range. "The frame of reference is simple CG, for cost," noted David Seigle, President of In-Three Inc.

3-D momentum is also present in the post-production world, said Michael Philips, of Avid, which is working on 3-D workflow for its Media Composer line. Ultimately, for the comfort of the person editing, 3-D material can be viewed and edited with just the right eye or left eye image.

The panel concluded with a live stereoscopic editing exercise, conducted by Quantel's Mark Horton.

Report from ASC: Look Management and Its Relationship to Digital Cameras

The technologists of the American Society of Cinematogra-

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...with NAB President and CEO David Rehr at TV Hall of Fame Luncheon



Photo © Mark Foreman

SMPTA Executive Vice President Ken Fuller with Michael Karagosian and Paul Hearty

phers (ASC)—who were quick to point out that they're not an official standards-setting body, but rather a group of cameramen who like to get together every month—described the work they've done to create a metadata-based interoperability specification called "CDL," for Color Decision List. CDL aims to manage the exchange of primary RGB color correction data. "The real salient point is that we are not baking anything into any images—we are moving metadata," said Lou Levinson, Senior Colorist, Post Logic Studios.

In a live demo, Levinson and Josh Pines, VP/Imaging Research for Technicolor Digital Intermediates, color-corrected three different images on a Gamma Density system, saved the changes to a flash memory stick, then opened the files on a DaVinci system. The color corrections carried through, showing that vendor interoperability works using CDL.

Keynote: Eberhard Sinner, Bavarian State Minister for Media & Film

Of the 6,000 theater screens in the world that have been upgraded to run digital cinema, 851 are located in Europe, and one third (276) are in the U.K. France and Norway are also experiencing strong growth; all cinemas in Norway will be upgraded



Photo © Mark Foreman

SMPTE Engineering VP Wendy Aylsworth with Keynote Eberhard Sinner, SMPTE President Bob Kisor and SMPTE Editorial VP Pete Ludé

to digital by 2010. Germany will spend 226M Euros (more than \$350 million) to upgrade its theaters over the next 5 years.

Challenges include the lack of digital content, which is impacting art house participation. "Many ... see no reason for a conversion to digital equipment while there are an insufficient number of films." Plus, cinema operators are reluctant to solely shoulder digitization costs, because digital and filmed content will co-exist for quite some time.

"I can assure you that Europe is working intensely to overcome these challenges—and as one of the world's leading locations for film technology, the greatest importance is attached to a digital rollout...to an area as wide as possible," said Sinner.

Introduction to CineGrid

CineGrid (www.cinegrid.org) is an international non-profit organization, focused on producing and exchanging 4K and high-quality digital media over high-speed optical networks. Members include a mixture of media arts schools, research universities, scientific labs, post-production facilities, and developers, connected via private GigE and 10 GigE networks.

In a 2007 CineGrid proof-of-concept project, digital content was captured in Prague using a Dalsa Origin 4K camera, then transferred to the University of California at San Diego for de-bayering. The RGB images were returned to Prague for post-production, and a colorist was linked in from Toronto.

The two facilities were separated by 7,500 km of light, which emphasized the need to emulate, at a distance, the over-the-shoulder relationship between the colorist and the cinematographer.

"It worked, and we removed a significant geographical barrier" from movie making, said Paul Hearty, Ryerson University.

Spotlight on Projection Technology: Is Laser Light Source Practical?

The two big concerns about the use of laser lights in cinematic projectors are safety and the permit process. On safety: "There will be no significant safety hazards associated with this light—plus, in cinema installations, the projection lens is very high above the audience, so there is no accessibility by the audience to that high-intensity light," said Casey Stack, President of Laser Compliance.

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...with CBS Engineering and Technology executives Brent Stranathan, Bob Ross, Bob Seidel who is also SMPTE Financial VP, Joe Flaherty and SMPTE Engineering and Standards Director Peter Symes



...with Napa Valley College students and broadcast engineering technology instructor Steve Goze (bottom left) for annual trek to NAB

The “Laser Light Show Variance” permits, granted by the U.S. Food and Drug Administration, are free.

The benefits of laser light for projectors are many. One, they provide substantially better color quality for digital cinema, said Gregory Niven, of Arasor Corp. Two, they improve the economic return for theater owners, because replacements occur every 7 to 10 years, versus every 3 to 6 months, for lamps.

Laser light engines are practical because of the DC-28 specification, noted Bill Beck, CEO of Laser Light Engines. Also, because lasers produce scalable power of up to 60,000 lumens, they're naturally applicable to 3-D content. “3-D could still use a little help in the brightness area,” Beck said. “Laser light is highly polarized, which makes it a good light source” for 3-D.

So far, laser-based projectors are primarily in test mode, with deployment announcements expected in the October timeframe and into 2009, Niven said.

Production Pipeline: Digital Intermediate Takes Over

In 2008, only one movie from Warner Brothers will be cut on film without a digital intermediate—most others will be created and corrected in digital, as the main version, then printed to film as necessary, said Wendy Aylsworth, Senior Vice President of Technology, Warner Bros. It's a sizable change in workflow, which was the focus of this panel.

Mitch Bodganowicz, VP of Imaging Science for Post Logic Studios, noted that 4K processing is costly in terms of storage, processing power, and especially bandwidth requirements. For that reason, only process what you need, by driving raw footage processing from the editorial list. “It's important to plan your data throughput, and where you need to go with your data, at all times,” Bodganowicz said.

Archiving of 4K content is also costly. Consider a 5-reel feature in 4K is the data equivalent of 6.7 to 9 Tbytes of information—and that doesn't include all captured material.

From a best practices perspective, it's important to involve DI in pre-production testing, said Glenn Kennel, SVP/GM of Feature Film Services for LaserPacific Media Corp. “Don't leave post for post unless you want to pay more.”

Siegfried Foessel, Fraunhofer Digital Cinema, described a workflow project funded by the Bavarian State Ministry of Economic Affairs, Infrastructure, Transport, and Technology and based on a JPEG 2000 workflow. The project runs from March 2006 to September 2008 and involves a cinema cluster and a TV cluster.

Real World Experiences with 3-D

Reports from the real world of 3-D indicate a need for continued work on two big items: Lighting, and cross-talk. Lighting, because “stereoscopic images can drop as much as 85% of your light—that's huge,” said Howard Lukk, VP of Production Technology for Walt Disney Studios. Minimizing leakage between left-eye images and right-eye images, called cross-talk, “is also something we should be working on.”

In-Three's David Seigle described how the human brain interprets depth cues, and how material dimensionalized for a 40-ft screen can be depth-graded to a 15- or even 5-ft screen. “Overwhelmingly, people watching the 5-ft screen liked the material graded for the 15-ft screen...I suspect if material is targeted to be on a 15- or 20-ft screen, it'll look great on a TV.”

Subtitling, which can be required in as many as 15 to 20 languages, is also an issue in the 3-D world: “You look at them on a 3-D movie, and you're throwing up in no time,” said Wendy Aylsworth. Two methods were tested in four markets. One method placed subtitles above the scene, not below. “More often than not, the top of the image is at a vanishing point,” Aylsworth explained. “It's less disturbing to the eyes.”

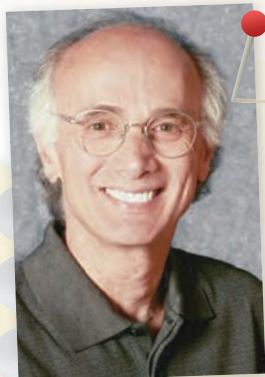
John Nicolard, Head of Digital Production for FotoKem Digital Film Services, closed the panel by discussing work done to make “Hannah Montana” 3-D. “A 4.5-minute song is different [from] a 90-minute movie, when it comes to 3-D,” Nicolard said. “It's important to tailor the 3-D convergence in a way that's appropriate for the material and the timeframe viewed.”

Exhibition Perspective: Truth & Consequences in the D-Cinema Rollout

Digital cinema brings theater owners opportunities in advertising, 3-D, and alternate content—operas and theaters are



Students from Ryerson University's Radio and Television Arts program singing “O Canada” to close out the Canadian Suite festivities at NAB



“The fact is, of the three VPF deals active today, not one has all six studios on board.”

Michael Karagosian

fast becoming good partners. But business challenges persist, mostly around financing. One is the “digital penalty” impact on exhibitors, whenever one of the six major U.S. studios doesn’t participate in a virtual print feed (VPF) deal. For instance, noted Michael Karagosian, President of MKPE Consulting LLC: Consider a VPF agreement where exhibitors are expected to pay 20% of what are heavy digitization costs, with studios collectively paying the remaining 80%. If just one studio abstains, exhibitor costs can swell to 32%.

Other issues on Karagosian’s challenge list: Theater owners bearing the cost when DCI standards change, and a lack of interoperability in sending and managing security keys.

American Multi-Cinema (AMC), one of the digital pioneers dating back to 1999, is 2K digital in 100 locations on 117 screens, and is 4K digital on 90 screens. All is well, said Dan Huerta, Director of Technology for AMC. He seeks improvements in file transfer speeds from central ingest points to media blocks (screens). “We’ve exceeded 300 Mbits/sec, but we’d love to improve on that.”

Marcus Theaters is up with 12 digital screens out of 700; two are 3-D. The reason for the slow roll: Digital alone provides no marketable consumer benefit, and, the maintenance necessary for digital, relative to 35mm, is high.

“I want to see a wow factor...we have to move forward—we can’t just move sideways,” said Mark Collins, Director of Projection Technology for Marcus.

Integrator Access.IT is up to 3,700 digital screens in 360 locations, and has VPF agreements with 4 of the 6 movie studios. The going-forward key to scaling up in the U.S. and elsewhere is managing key flow, said Jeff Butkovsky, CTO. “We’re doing 8,000 to 14,000 key deliveries per week,” he said.

Also important: End to end training, planning, workflow, managing alternative content, and sticking to two deployment windows per year. “That way you’re not upgrading systems constantly.”

Screenvision, which provides advertising to 15,000 U.S. theater screens, is actively aggregating alternate content from film festivals to help exhibitors fill up unused time on digital screens, said John Missale, CTO.

Advanced advertising is in the mix, too, to add account management, targeting, and audience measurement. “We want to give the advertiser complete reporting and campaign management, bundling the Web and mobile with the core cinema platform,” Missale said.

Thwarting In-Theater Piracy

An estimated \$18 billion a year in movie revenues is lost to theft. Movie theft has two eco-systems: Online, and hard goods. On opening weekend, in-theater camcorders capture the film, which is then pressed to DVD or distributed online.

As an example, when *Pirates of the Caribbean 3* was released, a total of 53.5 million illegal downloads/copies were made, which were concentrated heavily in France (18%) and Spain (15%), said Richard Atkinson, VP of Anti-Theft Strategy & Operations for Walt Disney Studios.

By focusing on reducing the number of individuals equipped with professional-quality camcorders in movie theaters, an estimated \$37.5 million reduction in theft can be realized per title, Atkinson said.

Disney and other studios work closely with the clandestine Red Tail Corp., a San Diego-based group of former Navy Seals, who target in-theater thieves through the use of night-vision goggles and audience profiling. Randy Kelley, CEO of

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...with Sony executives John Scarcella and Alec Shapiro at Sony’s press conference



...with Peter Fannon, Joe Flaherty, Carol Darling, Bob Plummer, and David Wood at CBS Engineering Breakfast

Red Tail—in a rare public showing—said that since '07, Red Tail has had seven captures.

“We’ve documented a single suspect’s actions in three states—these cammers will go across state lines just to get a good upload.”

One suspect, captured in Canada, admitted to netting about \$70,000 in three months in a sophisticated operation that involved camcording the movie, walking to a secure server farm facility with biometric access, and uploading the movie in 20 separate pieces. “He was recruited online. He never met his handlers—he just got paid,” Kelley said.

Ronald Maandonks, CEO of Philips’s Content Identification Division, detailed the use of digital watermarking to prevent theft. Each watermark is sized at 35 bits for every five minutes of material. From a standards perspective, the anti-theft mechanism selected by DCI is FIPS 140-2, soon to be renamed FIPS 140-3.

Keynote: John Fithian, President/CEO, National Association of Theatre Owners (NATO)

NATO operates in all 50 states, and in 40 countries worldwide. Digital cinema is the binding agent lately, especially since the death knell was incorrectly rung for theater owners in the 2005 timeframe, because of lower-than-expected box office revenues during a time when home theater installations were on the rise.

“Cinema has returned to its long-term pattern of growth,” Fithian said. “People who love movies are promiscuous: They love them everywhere.” In fact, people with more ways of watching movies at home are the same people who go to the movies the most.

Digital cinema is in good shape from a standards and quality perspective. The third leg of the stool—business models—is working, but could work better.

Reasoning: Digital cinema installations cost two to three times as much as film technology, and don’t last as long. “For the exhibitors I represent, that was not an equation that said ‘step up and buy this.’”

Today’s basic model, with integrators in the middle and studios making contributions via VPF, is working and that explains the rise to 5,000 digital screens in the U.S.

Smaller independent cinema owners are served by NATO’s Cinema Buying Group, which represents 8,000 screens and is served by Access.IT as integrator.

3-D technologies are a big driver for digital cinema, pending final deals between studios and cinema owners—which are currently at an impasse.

“There is a potential train wreck coming if we don’t solve this right now,” Fithian said. Why, because in '08, a few pictures will be released in 3-D. Upwards of ten 3-D movies will be released in '09. “There is major product coming, and we don’t have the screens for them—less than 1,000 digital screens are 3-D...we literally need these deals now, to make that movie slate for '09 work.”

The future of the cinema business is strong, not only because of 3-D and the use of digital screens for alternate content, but also because of luxury cinema, with fancy food service, alcohol sales, and babysitting services.

“If we get over this hump, I believe the future is very, very positive—but we have to get these deals in these next couple of months.”

Global Initiative: An International Update on Rollout

Panelists representing the U.K., Italy, India, and Russia discussed the status of digital cinema rollouts in their territories.

U.K.: Of 3,500 screens in 650 cinemas, DCI is up on 240 screens and 200 cinemas, with no VPF payments. “3-D is increasingly the big locomotive” for digital conversions. Alternate content is also big—a Rolling Stones concert billed as “the world’s biggest premiere” was beamed live to 104 U.K. cinemas, collecting double the ticket price.

“Alternative content is working—it’s not going to take over the business, but it is working,” noted Pete Buckingham, Head of Distribution and Exhibition for the U.K. Film Council.

India: Senthil Kumar, Media Technologies Director for Real Image, pointed out that the Indian cinematic marketplace produces about 1,100 movies a year, in 21 or more different languages. Most content is independently produced. Most screens are independently owned, too, “which is a nightmare—we joke that there are 10,000 screens, and 15,000 owners.”

Less than 10% of box office revenues are from Hollywood films; ticket prices average \$0.44, and taxes on box office revenues range from 15 to 50%. For that reason, “DCI-quality equipment is not viable, even at \$60k/screen.” An alternative is E-cinema, which will reach 2,000 screens by year-end.

Russia: The Russian movie industry began in 1996; screens totaled 1,300 in 2006. Most are multiplexes. Russia debuted its first digital release at the end of '96. By 2007, 39 of 1,510 screens were digital. 3-D movies are trickling in, but with great promise—ticket prices are 70% higher. “We expect 2008 will reach \$800 million in box office, overall,” said Alexander Rubin, CEO of Kinoproekt Ltd., in Moscow.

Italy: Angelo D’Alessio of the CDG-Media Innovation Center noted that in the minds of European Union (EU) exhibitors and distributors, D-Cinema is a “beautiful chaos.” He also shared issues affecting the EU D-Cinema evolution including “Exhibitors needs competitive business models to cover the EU diversities. One VPF do not fit all,” and “Questions from young exhibitors: why the Cinema must become a big Home Television Room?”

Practical D-Cinema Mastering

John Hurst, CTO, Cinercert, “Everybody knows that the major studios can make D-cinema packages, but what about the rest of you: independent productions, advertisers, student filmmakers... Can you get your material on a digital screen without having to fork over more money than you spent making it? The short answer is yes, anyone can make a DCP, but, as Chef Gusteau might have said, not everyone can make a good DCP.”

Industry Updates

The conference also provided expert updates from the individuals and groups working with ISDCF, DCI, DC-28, NATO, the Art Directors Guild, and the stereoscopic projection community. Many of these groups provide updates to the *SMPTE Motion Imaging Journal* through our Progress Report. Don’t miss the next SMPTE Progress Report scheduled for September 2008.