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To: Digital Synthesis Attendees and Interested Parties

From: C. R. Caillouet, Technical Director

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It's a Wrap…

Is it a wrap?

Did we finish the job?
What did we learn?
What can we take from these hectic 3 days?
What do we do with all that info?
We have heard about vastly different approaches to message delivery, which is basically what we are all interested in. Which ones are we to grab and run with?
Do we focus on capturing 15,000 lines stills in order to build a virtual world inside a computer like Pierre de Lespinois and try to recreate for the viewers, a world that we can't visit in person?
Do we aspire to manage a crew of a hundred people?
Do we try to emulate Barry Clark and shoot Super-35 for our next museum piece?
Or do we scarf up the latest $4,000 HDV camera, a Powerbook, a couple of firewire drives and Final Cut Pro, and charge off to find windmills with our names on them?

Who are we, anyway?

One of the amazing things about the symposium is that the people who attend represent the entire range of jobs and levels of achievement associated with the natural history presentation business.
Some of us are the content drivers from the currently popular paths that programs take from ideas to eyeballs. Some of us are the producers and practitioners at the top of the profession, who are willing to share a lifetime of experiences. Some of us are just getting started and are trying to figure out which way to charge. But we all either have a job involving the creation of natural history content, or have a passion for the natural environment.
The lucky ones have both.
We all share another common thread that we often don't realize – that is that no one of us can possibly understand everything about all aspects of imaging technology and production. Often we think, "It must just be me. Other people understand this stuff."
Well, it ain't necessarily so.
Pierre and Barry are close to the top of the production pyramid and they told us that they can't keep up with all the whiz that goes by these days. They have to rely on others for support. We are all in that boat.

That is a big reason for figuring out how to get out here for the Symposium; for dragging yourself out of bed for a breakfast roundtable; and for still being here at the end of three days of information overload.

That is what this panel is about.

"What panel?", you ask?

The working title of this session was, "You are the Panel," and so it is.

For the next hour or so, I will try to give you a little context for some of the things that you have seen and heard over the past few days, and I will try to answer questions that you might have, or direct them to the expert sitting next to you. The important thing to remember is that we can't do this alone. We have to listen to each other.

The Symposium Systems

I'll start by exploring the equipment that we used to present the material that you watched during the past three days and give you a few clues about pitfalls that I have encountered.

Let's start from the screen and work back through the system.

The screen that you are looking at here is a silver screen with no gain, installed especially for the 3D screenings so that the polarizing effect (the key to typical color 3D with passive glasses) is not affected by the nature of the screen that we normally use here.

This screen is slightly smaller than the normal one, which is provided to us each year by Dolby. That one is perforated to allow Steve and Ron to place their speakers in the optimum place for the proper sound image. (Yes there are sound images and, if you saw Blue Planet or any of several other screenings, you know that the sound can make you believe that the pictures are better than they are. A screening can be an emotional experience, and emotions are stimulated by more than just vision.)

The perforated screen is16:9 – literally, 16 by 9 feet.

The screen is illuminated by Panasonic PT-D7600U SXGA large-venue DLP projectors, operated in a non-anamorphic 1280x720 format.

If you were in Jackson last year, we used the same screen, illuminated by a Panasonic 9600 projector. That projector is rated at 12,000 lumens. We used the 7600 as a data projector and ran some tests while we were there to see how the 6000 lumen 7600 stood up to the 12K model. The results were impressive. So this year, we decided to use the 7600s all around because they were easier to come by than the bigger 9600s.

We have two 7600s on the main screen for the 3D showings but when we measured the light level during setup, we found that we could get a comfortable 22 fl with one projector and have none of the issues associated with keeping two projectors aligned across multiple formats in a temporary installation. So we ran a single 7600 with nearly twice the brightness of a typical movie screen.

That extra brightness was handy because, for various reasons, we didn't always run the house lights all the way down, like you would in a movie theater.

You may have noticed that John Galt of Panavision asked for house lights to be brought down during his showing and after that, we tried to keep the lights as low as possible during the screenings. The viewing conditions play a big part in the achievable contrast range of a display systems. It's just not always easy to work in the dark and some presenters are more concerned about audience contact than optimum projection. We try to accommodate the presenters.

The data projector was the same model and that came in handy when several panelists wanted to play HD from laptops. That is a new development and we will probably see more of that in the future. (We also noted that we need drapes behind the screens to eliminate scaffold print-thru.)

The main screens were fed via HD SDI from an digital router and the data screens were fed analog RGB using CAT5 extenders. The CAT5 extenders gave us better performance than we had in the past because they include equalization for the cable length. Don't forget that you need to equalize an HD coax if the run is more than about 50 feet. Even at that length, you will have losses. The signals from laptops are often higher in bandwidth than those from HD video because they are usually progressive sources with high pixel counts, and getting higher by the year. The Evertz digital HD router was fed by an array of signal formats from several tape and disk formats.

The 1080p24 and 1080p25 footage came from Sony HDCam and Panasonic D5HD. (Deep Blue was 1080p25.) 1080i footage came from HDCam, D5HD and Panasonic DVCProHD. 720p footage came from D5HD and DVCProHD. The Panasonic DVCPro deck plays back all versions of DV, DVCam and DVCPro and the Sony M2000/1 deck plays back all flavors of BetaCam and 1080i HDCam. HDCam 1080p required an HDW-F500 deck.

Standard definition Beta and DVD formats were up-converted through a Teranex Volare 220 to 720p60 or 50 and DV formats were up-converted in the Panasonic 1700 DVCProHD deck to 720p.

We decided to use 720p formats to minimize the conversions to the projectors, which were running at 1280 x 720. The projector has a pretty good internal 1080i => 720p converter. You need to remember that even good converters can affect your images and multiple cascaded conversions and compression operations can result in unpredictable artifacts, so we always try to minimize processing.

Finally, we were prepared to show VHS through a timebase corrector and A/D into the Volare. I am pleased to report that this is the first year that we have not been asked to display VHS (NTSC or PAL). The Volare is a versatile box with analog and digital inputs and outputs. Unfortunately, the unit that came in didn't have the analog board installed but Teranex provided an external A/D which did the job. They also loaned us a DVD player with an SDI output which made the operation simpler. We switched the SD sources into the Volare with another SDI router from Evertz.

Audio was provided in mono, stereo, LT/RT, discrete 6 channel surround, and Dolby E surround. Steve Venezia of Dolby decoded the audio puzzle and fed the results through a Yamaha digital audio console to his surround sound system.

Adam Hagan of Hughes built a parallel sound system to handle wireless microphones, computer audio and small format unbalanced audio.

The problems that we had were bad cable connectors, getting the right sync to the right machines across multiple formats, and keeping track of changing requirements. One thing to be careful of is cable length. The "cliff effect" of digital signals is especially profound in HD SDI, where the signal is actually near that of L-Band microwave frequencies. That means that barreling two coax cables with a 50-ohm barrel – bet you didn't even realize that you often do that in analog video – can cause the signals to become garbled. Digital CAN be better, except when it's not there.

This was definitely not a tapeless environment, although QuVIS handled a large part of the 3D load today. The rest of the 3D was played from dual Sony HDW-F500 decks, controlled by Vince Pace's old Grass Valley editor. When we were handed dual 24p tapes for one of the sessions, the editor was stumped, so we reverted to good old machine-to-machine sync with no problems.

That's a pretty fair summary of the technical facilities. I'll get into the content in a minute.

But first, a few more comments about the state of the business…

People sometimes introduce me as a technical expert and I usually counter with the idea that I have just had the opportunity to make more mistakes than most engineers.

I am an engineer/technical producer/business owner/technologist/survivor in the business. Whether I am successful depends on what you define as success. I am a pretty happy camper because I get to do pretty much what I like and experiment with lots of high definition gear.

But my passion is a lot like yours – I want to communicate my concern for the environment. And I'm not floating in cash. The big advances of the past few years have allowed me to begin to experiment with my own systems rather than someone else's, although venues like this take me farther into the depths of the technology than I can go on my desktop.

My desktop currently contains a dual-2Ghz G5 machine, running OS-X, with a Decklink HD card and a ProMax drive kit. It has a GigaByte of RAM and a TeraByte of RAIDed SATA drives (non-redundant) inside. Now, I know a little bit about HD and a fair amount about Macs, but it still has taken me several months to get to the point where my "desktop" can really handle HD. I had to figure out why my home-built RAID array got slower on write than read when I added drives to it. And I had to figure out why Photo-JPEG was not really a viable option for HD editing. Then I had to figure out why all applications that spoke Quicktime didn't speak the same dialect and why some of my clips changed gamma and color across applications and platforms.

So I am here to tell you that it is possible to make this stuff work for a lot less money than it was a year ago, but anyone who tells you that this stuff is plug and play either has not done it or is after something you have. And legitimate vendors will tell you the same thing, as Jeff Merritt of Panasonic did in the "Taking Post to the Field" session a few days ago. That doesn't mean that you can't make it work or that you shouldn't try if you think that you have the capabilities and the drive to stick with it. It just means that you might need some help.

Luckily, help is out there. The internet, time-sucker that it is, provides amazing opportunities for support that weren't even a dream when I started out in HD, fifteen plus years ago. Some vendors actually put their manuals on line. Others sponsor user forums. And there are several independent organizations which provide industry-wide forums which are often monitored and/or supported by vendor representatives. Some examples are Creative Cow, Digital Media Net, Adobe and Apple. There are countless others and the ones that you choose depends on your hardware and software needs and level of expertise.

The Sessions…

Now to the meat of the Symposium – what I heard and saw in the panels and screenings.

<u>The Aesthetics of Technology -</u>

Do we cross the road just because it's there?

What can we do differently because recent technology now lets us?

Do we want to?

Barry Clark reminded us that riding the digital wave is fun but may be dangerous.

Leon Silverman pointed out that we have to think about archiving our products. We always did, but now we have more options and more opportunities to get confused.

There are more and more options from the top to the bottom and no formulas for deciding what is right for you. You have to learn enough about the options and map them to your resources and requirements. The only safe solution is to test the most attractive options. Anyone else's results will not reflect your judgment. Judge for yourself.

Pierre de Lespinois told us that all the wonderful new technology is great but the useful stuff is that which allows us to tell a story at a price that allows us to actually bring it to the screen.

Randall Dark sees HD as a art form and suggests that if we each need to decide what form of art we would like to practice.

Pierre pointed out that one aspect of technological advancement is represented by lenses with new features like stabilization and auto-focus, which allow us to capture scenes that we have never seen before.

Pierre is busy, trying to capture 26 stops of latitude and huge amounts of data (15,000 lines) so that he can create virtual representations of the real world – huge virtual sets. (Your mileage may vary.)

Market Futures...if we build it will they come?

Do they want it?

Programs, devices and services are all changing.

The traditional players are still here but there are new kids on the block.

Akimbo talked about VOD from the internet – Is this about changing the players in distribution, or just adding outlets? Who should we be dealing with?

FusionSpark Media talked about creating "interactive narratives".

Voom talks about the huge appetite that it has for HD programming. Will that appetite bring dollars with it? Or is it pie in the sky? What is the effect on independent producers? Will the new programmers represent real opportunities? Will they be able to make the deals that they want at the prices that make it possible for us to eat and still make programs? Will these optimists even survive long enough to find out?

Wild Nights - collaboration between different types of organizations

Following the exciting events in Jackson, last year, the Festival is trying to leverage our client base and that of some strategic partners, like museums and nature centers, who also have an interest in our programming. We are engaging in screenings of our Festival winners and educational programs for the next generation of environmentalists and natural history enthusiasts.

In Santa Barbara, with the help of our vendors, we are partnering with the Museum of Natural History on a series of screenings while we are in town.

Is it just about trading mailing lists?

We think it's about finding new ways to reach viewers in an increasingly fragmented edutainment world. What do you think?

Technology of Image Origination

Up to 4K; down to picture phones.

Is it about capturing reality or creating drama? Yes.

New cameras are approaching image capture from the different perspectives of reality reproduction, dramatic creation, and economic limitations. The first two address high quality capture, while the third tends to sacrifice overall quality for affordability. Each approach has a place. This is not a new phenomenon. We were wrestling with similar issues long before video came along. There is always a drive at the top for better tools and a tug at the bottom for universal accessibility. Better tools are defined by the preferences of the craftsmen and will vary with the emphasis of each school of thought. The momentum of the consumer mass market keeps the machines going which produce the high end tools and often drive the technology advances which allow jumps at the top.

So we see NHK, who brought us HDTV twenty-plus years ago, bringing us another jump to 4x1080-line HD – "above IMAX" – designed for a 450-inch screen, a viewing distance of 0.75 times picture height or a viewing angle of 100 degrees, with a 22.2 channel surround sound system and a 1.25 inch sensor. Yikes!

Sony/Panavision's Genesis addresses the community which focuses on dramatic creation, with a 12.4 mega-pixel single-chip imager, delivering 4:4:4, 10-bit log RGB output at up to 50 frames per second.

John Coghill from Dalsa was vocal about his soon-to-be-available, 4 mega-pixel, single-chip camera. It has been shown at NAB for two years now as it was being refined and could make a splash, as could any of several other cine-oriented approaches in the works.

Thomson's Viper represents the top of the line of 1920 x 1080 prism-optics cameras with a 9.2 pixel imager which can be configured for various formats at 4:4:4, 10-bit log RGB and up to 60 fields or frames per second.

And then there is Sony's SR recorder to handle the 4:4:4, RGB recording or dual stream 4:2:2 HD for 3D applications, including those from the Sony HKC-TD9, narrow body cameras. Fujinon and Panavision have also produced special lenses to accommodate the narrow cameras.

Of course, there are also tape-less solutions in the form of disks and solid state memory which are either here now or very close to offering different ways to capture, transfer, edit and archive your images, blurring the distinction between acquisition and post production. They are proliferating in SD and starting to affect HD decisions.

New cameras and recorders are also starting to address metadata, that other stuff that goes along with audio and video, and although there is still not complete consensus on what it is, many early adopters are using the available tools to carry useful information through the systems for their own applications.

And then there are the HDV cameras, coming up from the bottom. Like U-Matic, VHS and single-chip cameras, these consumer and pro-sumer products are appearing to cloud the landscape. Can they compete with the big guys? Yes and no. It depends on your requirements and resources. Can you use them to tell a story? You can use a brick to tell a story, if you are good at it and have a good story. 'Nuff said.

Oh, and one more thing… We once thought that single-chip cameras were the absolute low end of video. That was before digital still cameras came along and chips got really dense. Now you had better be careful before you write them off. As I noted, several manufacturers are serious about using single chip sensors in high end video cameras. They have some impressive advantages, like not requiring a beam-splitting prism and therefore, being friendly to film lenses. Prism cameras are not. One approach definitely does not fill all needs.

<u>Keeping You Posted</u>

The changing world of the post house

Leon talked about moving from "fixing it in post" to "creating it in post". The ability to capture a "flat" image in the field and to grossly manipulate it in post is possible with the new cameras and recorders. That does not necessarily mean that you can do it with any system. Many systems are still limited to 8 bit recording and processing. Beware of wise guys with easy answers.

Mark Chiolis talked about the range of image sizes that post is having to deal with in today's productions, from 4K to less than 1K and 4:4:4 to NTSC. Mixing formats is not a trivial process.

Leon talked a lot about "data-centric workflow" and how we manage it. Being able to move video around as files means that you now need to keep track of which version is which, which ones can be deleted, and which ones need to be protected and eventually, archived.

Leon got into archiving, too, always a fun topic when we existed in a lossy tape world. Now that we are moving to bits and bytes, there are new issues. Some examples are the proliferation of versions and the variety of data formats.

Dana Brown and Jason Rosenberg talked about a different approach to post, more aligned with the in-house approaches that we heard about later, but they emphasized the need for the expertise and high end support of a good post house.

John Coghill talked about the workflow driven by a new type of camera which MUST be post-processed to give maximum results. Mark talked about the Viper in much the same way. Here we are getting into a different view of the roles of field and post, where field captures as much information as possible and post sorts it out.

When we get to the large images and file sizes, we start talking about compression again. Yes, compression is used at the high end as well as the low end. Compression is a tool and the options are getting better and better, but the results that you get are dependent upon your ability to educate yourself and to choose the options which fit your project and your budget. The hot tip seems to be wavelet coding, which uses techniques based on the same concepts as MPEG2 but with much more flexibility and which fails much more gracefully.

Barry talked about removing barriers, increasing the signal-to-noise ratio of our projects and increasing the immersive experience for the viewers, by using the new tools becoming available to us.

<u>Taking Post to the Field</u>

DVCProHD , Firewire and Final Cut Pro HD: Do-it-yourself HD Post?

Mark Shelley talked in this session about DIY post and pointed out that while it might be fun to do it yourself, it might not be smart because others can do specifics like color correction, editing or graphics design better. The team concept is alive. Mark envisions a "traveling artist" concept where experts are available to come to your facility to help you out.

Jeff Merritt and Fred Grossberg did their best to explain the basics of bits and bytes and compressed and uncompressed video and data rates and even they got confused in the terminology.

Does everyone have it down now? Any questions?

The desktop editing era is here for HD. My dual G5 with the terabyte of non-redundant RAID and the Decklink HD card, (now selling for $595 – half the price that I paid for it less than a year ago, and two generations behind the current version) is more than just a toy. All I need now is a camera and a deck. Did you know you can now find old HD decks and cameras on the used market? Not the best and newest, but opportunity, nonetheless.

Jeff reminded us that although it seems easy, the systems are not necessarily plug-and-play and away you go. I can vouch for that. It takes research, testing and an open mind to pull it off.

<u>Natural History Hits the Big Screen - DEEP BLUE</u>

Digital Cinema – do we need the big screen to get the conservation message out?

The cost of the message is different but the potential is great, if you can afford it.

Is the format important to the message?

Can docs make it in the theater? Results from several successful ones this year are making us wonder.

Can HD make it in the theater? Can we mix formats? *Collateral*, a recent drama about Los Angeles at night was shot with the Viper, HDCam and film and the results were analyzed throughout the industry. Enough people liked what they saw to suggest that we will see more.

What about Deep Blue? This was a re-edit of footage from a BBC television series with good music and judicious editing to create a new product. The surround sound was a big factor in the experience and the mixed pedigree of the shots was obvious but it was pretty impressive.

HD3D and Large Formats

What about all the 3DHD that we saw today? What's this all about? Is it about hyper-reality? Can it make it at 24 frames per second?

I haven't been a fan of 3D in the past but I saw some very interesting pieces today. I didn't like all that I saw but I liked enough to decide that there is some serious potential here. I think that the practitioners are getting better at deciding what works and what doesn't and I heard them say that they understand that they have a way to go, but they are breaking ground and that is exciting.

Some of the issues are:

frame rates – some things work with 24 and some don't;

cutting style – we learned with HD that some things work in HD and not in SD and vice versa; the same is true for 3D;

size distortion caused by exaggeration of camera/eye separation; and

presentation complexity – active glasses and single displays might work in a living room to reduce system cost but they won't in a theater.

One of the most interesting items to surface in the 3D sessions had little to do with 3D. The results of John Lowry's processing of damaged or flawed footage into usable pieces was pretty impressive and drew kudo's from some of the crews. Some of his techniques can also be applied to finish work on products which are not necessarily flawed but which could benefit from the same techniques. How big is your budget?

Striking the set…and looking back…

Sorry, but I don't have any more answers. As you can see from this tome, I have lots of questions, just like you. The thing is, each of you has your own answers. The questions you ask and how you decide to answer them determine the direction that you go and how successful you will be.

These sessions are important to us because we start to understand which questions are important to our projects and how to phrase them so that the answers are useful.

If you were in the wrap-up session in Santa Barbara, you might be thinking that I didn't say everything that is in this paper. That's because this is just my take on the three days. I just got started and still talked too much. The most important part of the session was the question session, which I haven't even tried to reproduce.

What I hope that we all came away with is the sense of excitement that I got from sharing three days by the ocean with some very talented folks.

See you in Jackson in 2005 for another fix.

cheers,

C. R. Caillouet, Jr.
Symposium Technical Director