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Dr. Robert Hopkins,
Senior VP/GM, Sony Pictures
High Definition Center

Sony Pictures' Digital HD Prescription

By Debra Kaufman
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Dr. Robert Hopkins, senior VP/general manager of Sony Pictures High Definition Center, describes a major film studio's strategic use of leading edge digital technology at the dawn of Hollywood's second century.

Mention the word Sony and electronics products immediately come to mind. For filmmakers, however, the name signifies not only cameras and VTRs, but -- in this age of diversification -- a major motion-picture studio and production facilities as well. Sony bought Columbia Pictures in 1989 and, soon thereafter moved it to the historic, renovated former MGM lot, in Culver City CA.

Synergies with Sony's hardware divisions were inevitable, and among the first of these was the Sony High Definition Center, which today plays an important role in applying the latest digital technologies not only to Sony Pictures' content -- including the recently released computer graphic (CG) movie "Final Fantasy: The Spirits Within" -- but for that of other studios and producers as well.Dr. Robert Hopkins, the senior VP/general manager of Sony Pictures' High Definition Center, has been part of the digital imaging revolution since its earliest days. After earning his B.S.E.E. from Purdue University in the mid-Sixties and, later, a Ph.D. in electrical engineering from Rutgers University, he went on to design and build a digital frame store/synchronizer for RCA's broadcast division -- one of the earliest applications of digital technology for video imaging. After serving as general manager of an RCA facility in Europe, Hopkins went to Washington DC in 1985 to serve as executive director of the fledgling ATSC, or Advanced Television Systems Committee, an organization set up to develop today's HD standards. After 11 years in that role, Hopkins joined Sony Pictures' High Definition Center, where today he plays a pivotal role in integrating digital technologies into the studios' production work. Digital Cinema contributing editor Debra Kaufman interviewed Hopkins to find out more about the facility's role in "Final Fantasy" and other productions.

What was your involvement in drafting the HD standard?
I was involved throughout the development of the standard that was ultimately recommended to the FCC by the Advisory Committee. I served as chair of the working party on standards, part of the Advisory Committee. Originally, the way the Advisory Committee worked was to accept proposals from companies on what the standard should be. Those were whittled down to half a dozen. I was chair of the Advisory Committee's special panel meeting in February 1993 to evaluate all the systems and make a recommendation. We didn't agree on a single system and, in May 1993, the Grand Alliance was formed by the different proponents to develop a single proposal. The Advisory Committee formed a technical subgroup to work with the Grand Alliance in developing a single proposal.

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I served as chair of the technical subgroup's video compression and scanning formats expert groups. Working with the Grand Alliance, we on the technical subgroup were able to convince the Grand Alliance to change their proposal in various areas. For example, the Grand Alliance was initially proposing that the total number of lines should be 960 (twice 480). The technical subgroup believed it should be 1080, and we were able to convince them to change their proposal. I played a key role in that. After the single system was developed, the ATSC documented the system as a standard for the FCC. As executive director of ATSC, I took on the role of the editor of the standard, pulling it together so it looked like one person wrote it. The special panel report is on **the ATSC site**. The final technical subgroup report is also on **the ATSC site**, along with **the Advisory Committee's final report.** I put all these on the Internet when I was at ATSC, to make them available. What the FCC adopted, the ATSC Standard A/53, can also be found **on the ATSC site**.

Tell us about the history of Sony's High Definition Center.
The High Def Center was first formed around 1987. Some of the Sony people involved in setting it up were Dick West, who came out of RCA, and Bill Connolly, out of CBS, both retired now. Sony wanted to introduce HD equipment to the Hollywood film community, and this was set up both as a demonstration and an R&D facility, to see what could be done with HD in the film environment.When Sony bought Columbia Pictures in 1989, they moved the HD Center, which really hadn't started up strongly, to the Culver City lot of the new Sony Pictures. Much of the work they were doing involved using HD in production and developing telecine equipment to run at HD rates. Then, in 1995, a clear decision was made in Sony Pictures that mastering of film -- the transfer to video -- should begin in HD. Any new pictures would be transferred using HD and, for any existing title where there was a market demand, if it did not already exist on D-1 tape, we would also do an HD transfer. When DVDs came along, the policy changed so that, even if a D-1 copy did exist in the library, we would remaster it to HD and then down-convert the master for DVD. Virtually all the Columbia Pictures and Tri-Star titles on DVD came from an HD master.

Part of the reason that Sony Pictures made the decision to master on HD, even for VHS release, was that if it came from an HD master, it was a superior picture. You could see the difference, even on VHS. Also, you had an HD master sitting in the vault, ready for whatever distribution medium required it. Those were the two benefits.

That's where I came in, at the beginning of 1996. Up until then, the facility had been more of an R&D place, reporting to Sony Corp. of America. Now, with me running it, it became a profit-and-loss center reporting to Sony Pictures. The challenge given to us was not just to do work for Sony Pictures, but for whomever we could entice.

What did you do to set up the facility to accomplish that?
To turn the place into a profit center required a difference in outlook. We lost some good people over that time, because they wanted to be part of an R&D environment rather than an operating post house. But other people were attracted to us because we're doing exciting things. It was a matter of making sure they were the right fit for the job.

What do you do in regard to theatrical features and digital filmmaking?
The biggest amount of work we do is transferring movies to HD. We generally work from an IP, make an HD version, and then down-convert that to D-1, and that becomes the master for all the standard-definition output, whether it's going somewhere to be broadcast, to a LaserDisc, DVD, or VHS. Generally, when we're doing a transfer, we end up with two versions, both in HD.

One version is the theatrical aspect ratio, letter-boxed into the 16:9 HD screen. The second transfer we do is 4:3 full-frame. If it's a 1.85 movie, we'll do it with full Academy aperture and that'll get down-converted to full frame 4:3 standard def. If it was a 'scope picture, we'd do a pan & scan to make a 4:3, also in HD. These two HD tapes then go into the vault. They're also down-converted to D-1.

That is the primary work we do, but we also take material shot digitally -- in standard definition (SD) or HD -- and transfer it to film via our in-house Electron-Beam Recorder (EBR). Our sister company, Imageworks, has a laser printer. We also work with outside companies, such as E-Film. We worked on the Academy-nominated documentary "Regret to Inform," which was shot in NTSC, up-rezzed to HD, and then recorded out to film on the EBR. Another one we did was "Buena Vista Social Club," which was shot in PAL, up-rezzed to HD, and then transferred with the EBR. "Our Lady of the Assassins," shot in HD in Colombia by Barbet Schroeder, was transferred with Imageworks' laser printer. We also did all the online editing and color correction and made data that went into the Imageworks laser printer.

Isn't the HD Center also involved in digital restoration work?
Yes. When you have all these capabilities, you can go from film to digital, fix it, and then go back out to film, for a restored print. When they discovered a print of "Matinee Idol," a Frank Capra film that was lost for many years, we did the restoration, frame by frame, and then printed it to film. That was shown at the Motion Picture Academy in 1998, to celebrate the 100th anniversary of the birth Frank Capra.

Digital image restoration is a market we've gone after. "Easy Rider," released in 1969, was a low-budget film and they made the release prints directly from the camera neg. A couple of the reels got trashed in doing that. They made YCMs and threw away the negatives. The YCMs showed that damage. We transferred them to HD, combined them in an edit suite to make a color picture, registering it, and then printed it to film. The DVD of "Easy Rider" comes from the restored work we did. Right now, we're wrapping up some work we've done on Capra's "That Certain Thing."

What work have you done for digital cinema releases?
We've done some digital cinema titles. When we color correct, normally we do it under the guidance of filmmakers on a CRT display, a high-quality, professional monitor. But digital cinema has other requirements because, at a digital cinema theatre, the digital projector has different characteristics. The blacks will be different, the colors will be different. When we do work for digital cinema, we do another color-correction pass under the direction of the filmmaker to make sure it looks how they want it to look on the digital projector. We did that for "Stuart Little," which had a digital cinema release in Japan, "Vertical Limit," which was released at a digital cinema theatre in the U.K., and "Spy Kids," which ran at ShoWest last March and had a digital premiere and digital release. And, of course, we're in the process of doing "Final Fantasy."

What is the experience of preparing the material for a digital cinema presentation?
For "Spy Kids," the answer print hadn't been done yet, so some of the transfer came from untimed IP, and some came from CG on data tapes. We put it together in an edit suite and did the color correction on the TI projector. On "Final Fantasy," it's 100 percent CG.

Describe your work on "Final Fantasy" in greater detail.
We got the data tapes and transferred them to HD. Once that was complete, we did the color correction. Going into it, we didn't know how much would be needed. The filmmakers did their color correction with a video monitor, not a computer monitor, with the intent to make it correct for videotape. We'd be looking at it in HD, though, and making it look the way the filmmakers want it to look on the big screen and in the home video version.

Everything went super-well. The way the movie has been given to us is that all the sequences were compiled into the equivalent of six movie reels. Each of those were given to us individually, as a sequence of frames, all as individual data files. We took those files one at a time, as an automated process, and did a cut-and-paste into an HD frame. You end up with an HD videotape that'll play in real-time. They compiled these before all the different CG shots were signed off by the moviemakers, so sometimes they gave us a final shot separately, which we then dropped into the original HD videotape.

With all the data transferred to HD, we went into color correction. As I mentioned earlier, the colorimetry of the DLP projector is different from the colorimetry of the CRT -- we went through and trimmed the color correction to make it look the way the filmmakers wanted it to look on the DLP.

A second thing that is different is that the blacks aren't as deep as the blacks on a CRT. On a CRT, you just turn off the beams to get true blacks. That's not the way the DLP or film works. With film, even though you have a black frame, you still have a bright light going through the black frame, so some light does get through. The same thing is true with the DLP. Because you can't make it totally black, sometimes it looks better if you make other adjustments to compensate. For example, you can make the grays a little bit whiter, which makes the blacks look a little bit blacker.

But we didn't need to do that much trimming to satisfy the "Final Fantasy" filmmakers. We were able to accomplish the entire color correction in a couple of days because they'd done a very good job getting the colors the way they wanted them making the CG images in the first place.

Did you do any other work on "Final Fantasy"?
In addition to dropping the credits in, the next step was when the sound was done, at Skywalker. We married the two together on a QuVIS QuBit server.

How is the Sony Pictures High Definition Center connected to the Sony Pictures Post Production Facilities, the Digital Studios Division, and the Sony Pictures DVD Center? Do they work together? Do they pool resources?
The HD Center is part of Sony Pictures' Digital Studios Division (DSD), which is comprised of four groups that work in a seamless manner to create digital entertainment as well as more traditional theatrical entertainment. Other parts of the DSD are the DVD Center and the Post Productions Facilities Department, and Worldwide Product Fulfillment. Yes, we share resources and work together. Take the example of an in-house picture title. Post Production may have done the theatrical sound on it, and they would do a remix for DVD. We would transfer it to make a digital master and then do the scene-by-scene color correction with the digital master. That'll go to the sound department, and they'll do the mix. What we do helps the sound department, and then our video and their audio goes to the DVD Center. That's one good example of how we work together.

Is the Sony HD Center the de facto place that filmmakers go to for digital solutions when those filmmakers happen to be making a movie to be released by Sony (Columbia/TriStar) pictures?
In many cases, yes, unless they have a personal relationship with another entity. For example, the movie Panic Room -- which is doing digital dailies -- is working elsewhere at the request of the filmmaker, because of personal relationships. Director Robert Rodriguez likes what we do here, he has a very strong relationship with us, and that's part of the reason Spy Kids was done here.

Do the experiences of the Sony Pictures High Definition Center and its sister digital facilities on the Sony Culver City lot -- and the solutions they develop or discover they need -- provide “feedback” to Sony Japan that is, in turn, used to create new products?
We have meetings with Sony Electronics, to give feedback. We do this also with non-Sony companies, but there is a stronger tie with Sony. In 1998, we won an Emmy for our work on high-rez film scanners. The Sony telecine came very much from work in the HD Center. The Sony Vialta was the result of all this. We were involved in the early meetings on 24P, along with Lucasfilm, and others. Sony Pictures was a part of helping to determine the specs of the 24P camera. We participated in those meetings on specifications, doing some of the early testing, and making film from those tests.

Is there a master plan for the future of digital cinema (production, postproduction, distribution, and exhibition) at Sony? Any thoughts or theories on this?
The person at Sony Pictures who makes these calls is Jeff Blake, president of marketing and distribution. The way Jeff has spoken about this is that he wants to do a small number of digital releases during this early period, and when it is appropriate to release all movies digitally, he'll be doing it. I'm just conjecturing, but what Jeff is really saying is that when there is a business reason for digital releases, Sony Pictures will be there doing them. Right now, there's only 30-some theatres. How many have to be out there to do digital releases? 500 screens? 1,000 screens? 2,000 screens? We don't know what that number is. Whatever that number is, when it's out there, we'll be doing digital releases. Yes, it's vague, but digital cinema is in more of a demonstration/test phase right now. When there are enough theatres to make sense to do a digital release on all movies, the plan is to do that.

What is the impact of the digitization of films on the ancillary platforms -- and how do you see it going in the future?
One of the things that I see happening in the future is that we'll be making a digital master of a movie, whether the movie was shot on film or with a digital camera. Once you have that digital master, you can print that to make film, or you can put it on a server (by physical or satellite distribution) for digital exhibition. It can be used for broadcasting in a later window. It can be used to make DVDs, whether it's down-converting for today's DVDs or some future HD DVD. And each of these versions can come from that one overall digital master. You may have one color-correction pass for printing the film, a different color correction pass for home distribution, another for digital cinema exhibition.

I see that as something that will be happening more in the future. Standards will evolve on just how to do this. We don't know exactly what the technical standards will be, but whatever we end up doing, that one digital master will service those many different needs. And we create that master.

We're talking about what an entire industry will do, not just us. But part of what we've been doing all along is that we're out in front with this. Where we are unique is that we're out in front in many different areas -- because of what we've done with film restoration, with printing movies shot in HD, with HD mastering, and DVDs. We're one of the leaders and intend to continue to be a leader in digital cinema and entertainment technology.
