Digitizing Hollywood - Why Did It Take So Long?

Glenn Kennel, Texas Instruments (USA)

Abstract

Hollywood has been slower to adopt digital imaging technology than just about all other industries. Even today, most movies are shot exclusively on film, and there are only 600 cinema screens in the world equipped with digital projectors, out of a total of over 100,000 screens. One of the key hurdles has been the overwhelming size of a digital movie- a "2K"movie is over 2 TB in its finished form, and might easily be 50 TB before it's edited.

Digital technology has certainly made inroads into the movie-making process over the past 15 or so years. Editing, once a physical process of cutting and splicing film on a Moviola, has turned almost completely to non-linear digital tools. The post production and distribution of soundtracks is entirely digital. The production of visual effects is entirely digital and much of the art of miniatures and animated creatures has been replaced with computer graphics. This presentation will explore the structural, business and technological reasons why the movie-making industry embraced digital technology in these areas, but has held back in terms of origination and theatrical exhibition. Several case studios of the introduction of new digital technologies to film-making will be presented, along with an analysis on why some were embraced and others were not.

First of all, the structure of Hollywood encourages risk taking when it comes to placed big bets on scripts and expensive stars for $100M blockbuster movies. However, this financial risk-taking is balanced by a very conservative approach when it comes to operations and new technology. With the big risks on the financial side, producers can ill afford to take a risk with a new, unproven digital camera or post production process. The Hollywood studios select, finance and market the movies, but they typically hire independent production companies to make them. These companies are formed for an individual movie and disbanded when the movie is done. This practice means that there is little institutionalized learning and that experienced directors and producers learn to rely on the people and technologies that they have worked with before. Other than very limited pre-production testing, there is no opportunity to try new things. Once the shooting begins, the producer makes sure that the picture stays on schedule and tries to keep it on budget. That leaves no time for experimentation or mistakes.

Another factor that discourages the experimentation and adoption of new technologies is the apprenticeship system that is used to develop creative talent in Hollywood. This applies to directors, cinematographers, editors, and others. Basically, they don't walk into the job with a degree in film-making. Instead, most follow a long, tortuous path of production assistant to assistant director or cinematographer to, if they are lucky and are in the right place at the right time and know the right people, the big break. The only way to short-cut this process is to succeed in some other genre first- maybe commercials, or music videos or episodic television- and to transfer the skills they develop to movie-making.

In the mid 1980's Sony introduced HDTV Electronic Cinematography to Hollywood with claims that the new high definition television technology made film obsolete. They attacked the whole process- origination, post production, and exhibition-with a range of products that far surpassed the standard television cameras, switchers, tape decks and projectors that were used for conventional television production. What Sony missed was that these tools were not as good as the film systems they were vying to replace. And they underestimated the defensiveness of the cloistered Hollywood community to what was viewed as an assault from a feared technology company. This will be explored in more detail, along with an approach that Sony is now making successfully, albeit 20 years later.

About the same time, Avid introduced the Media Composer, an Apple-based non-linear editing system that revolutionized the way movies were edited. Avid wasn't the first to offer a non-linear editing system, but the first to make it simple to use and inexpensive. In a few short years, the industry converted from cutting and splicing film on a Moviola to non-linear editing on Avid's systems.

In the early 1990's, Kodak introduced the Cineon Digital Film System to provide an efficient means of converting film to digital and back to film, with the intent of offering a computer-based environment for post production of visual effects and digital restoration. Kodak established Cinesite, a service bureau that offered film scanning and film recording services, to enable the industry. Within a few short years, visual effects converted entirely from the traditional optical printers and manual rotoscoping processes to digital compositing tools.

In the sound arena, Dolby, DTS and Sony (SDDS) all introduced competing 6-channel audio deliver systems in the mid 1990's. All the technologies worked reasonably well, but they were incompatible and adoption was sporadic and confused, driven mostly by big directors picking one system or the other for the exclusive release of their movies. It wasn't until one of the labs figured out how to put two of the three soundtracks on a standard 35mm print, without displacing the traditional analog soundtrack, that the industry widely embraced digital sound. Today, Dolby dominates the digital sound market with DTS a distant second and Sony exiting the market a few years ago.

Kodak's original goal for Cineon was a complete "electronic intermediate system" for digitally assembling movies. Frankly, it was motivated to protect the weak link in the film system from the encroachment of Sony's HDTV technology. In the early 1990's, it was not cost effective to digitize and assemble whole movies this way, but by choosing computer-based platforms over purpose-built (television) architectures, Kodak made a wise choice, and these costs can down steadily, driven by the much bigger investments in that other industries were making in computing, networking and storage technologies.

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By the end of the 1990's, Kodak exited the Cineon products business because this niche market was too small, and Kodak's products too narrowly focused to make money. And more importantly, Kodak's original strategic objective had been achieved, and several other companies were offering products that provided the necessary tools for digital post production of movies. However, Kodak chose to focus its energies on the demonstration and promotion of a new process dubbed "Digital Intermediate" that offered to revolutionize the traditional lab process of answer printing and release printing, providing digital conforming and color grading tools that opened up new creative opportunities while improving the quality of the release prints. Within 5 years, the industry has embraced the digital intermediate process, with over 50% of the major Hollywood films now finished digitally.

In 1999, Texas Instruments demonstrated DLP Cinema® projectors that woke up the industry to the promise of digital distribution and exhibition. Although TI focused on the picture quality advantages, the studios saw an opportunity to save distribution costs, replacing their $1,000 film prints with inexpensive digital files. Industry pioneers like George Lucas embraced this technology, with Lucas releasing Star Wars-Episode 1 in 1999 and imploring the industry to install at least 1,000 screens for Episode 2, due in two years. Needless to say, this didn't happen that fast, and in fact, there won't be 1,000 digital projectors until sometime this year. Why did it take so long, and why is it finally happening now? This topic will be explored in depth.

Digital origination is finally being used for major motion pictures, with big name directors switching from film to digital cameras. A major factor in the utilization of digital cameras was not the technology itself, but the ergonomics and the way it was marketed. The approach that Sony took (in the late 1980's) will be contrasted with the more successful approaches being taken today by traditional film camera manufacturers, Panavision and Arri, along with newcomers Thomson and Dalsa.

And finally, I will offer some insight into the hurdles for the industry to embrace the new digital content distribution opportunities- broadband delivery, pay per view, the networked home and mobile entertainment.

Author Biography

Glenn Kennel works for the DLP Cinema group of Texas Instruments in a role that includes technology and business development. His primary focus is working with the industry and digital cinema suppliers on interoperability and standardization. Previously, in a twenty year career with Kodak, he led the development of the Cineon digital film scanners and laser recorders and the prototype HDTV telecine that became the Spirit Datacine. As a consultant, he helped DCI draft the technical specifications for digital cinema. Kennel also chairs the SMPTE DC28 Color ad hoc group.