

# Digital Cinema in 2011: Trends in Rollout, Financing, and Technology

Media Salles, Helsinki & Tallinn

Michael Karagosian  
July, 2011

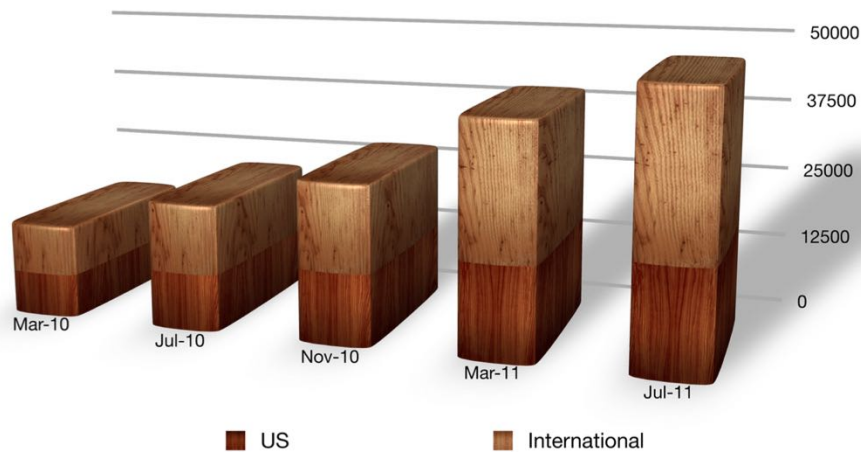


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I'm Michael Karagosian, president of MKPE Consulting, a consultancy in business development for new technology in cinema. You can learn more about me at <http://mkpe.com>.

# Screen Growth Doubled

Digital Cinema Screen Growth

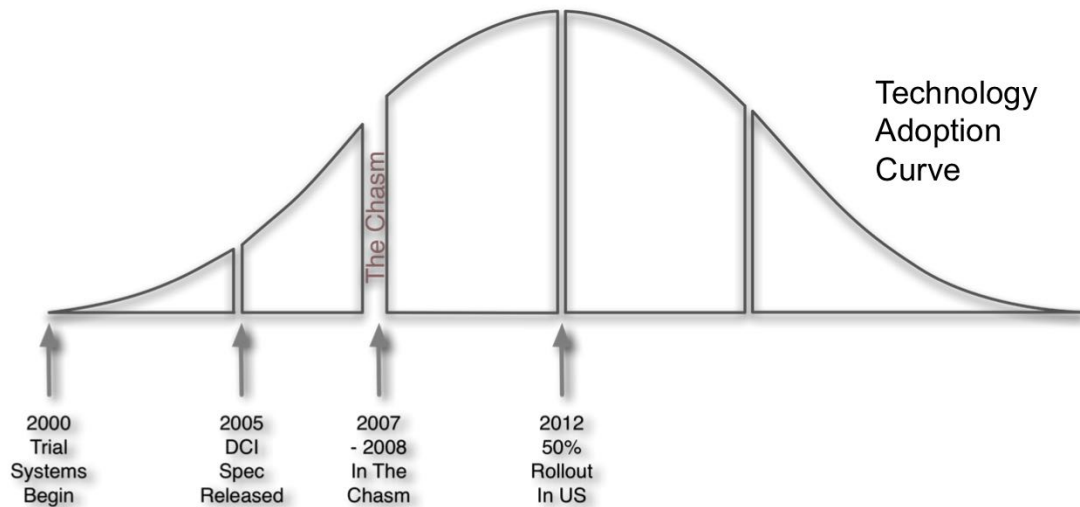


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The worldwide conversion rate for digital cinema has been astounding. Screen growth more than doubled this past year, from 22,000 a year ago, to 47,000 today. Equally impressive is that this growth is not led by the US, but by the rest of the world.

## Will It Keep Up The Pace?



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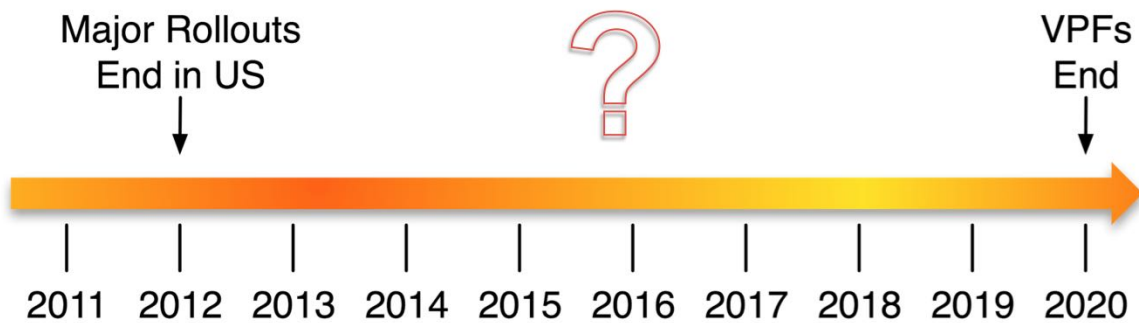
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When seeing such impressive numbers, it's important to keep perspective.

The classic technology adoption curve follows the Gaussian distribution shown. Each section represents a different classification of customer and often represents a different generation of product.

The digital cinema adoption rate has been following this curve from its inception, as shown in this chart. We're now in the 3<sup>rd</sup> sector of the early majority market, and 50% market penetration is within sight in most major markets in the world. Various stimuli drove the market to where it is today. But without further stimulus, the future adoption rate is likely to follow the right half of the curve.

## Film Cutoff



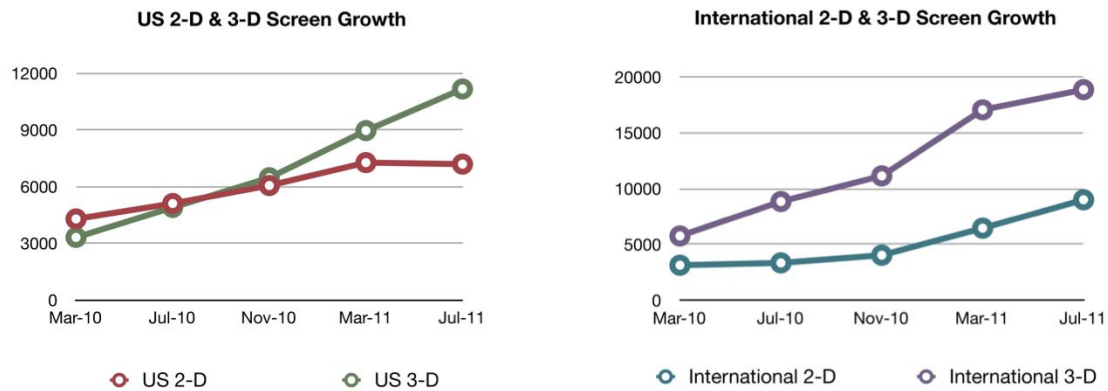
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Of course, the big question on everyone's mind is when will film distribution end?

Most major VPF-driven rollouts will end in late 2012 or early 2013, both in the US and elsewhere in the world. On one end of a sliding scale we have the 50% market conversion point. On the other end, we have the end of VPFs, which let's say occurs in 2020. The cutoff of film is purely an economic decision. Film print costs will rise, and by 2020, the cost of digital distribution will drop dramatically. (As the VPF adds to the cost of digital distribution.) It's unlikely that film will cutoff overnight, but rather it will diminish in a graded and purposeful manner that is driven by the economics of each movie release.

## 3-D Installation Rate Differs



The installation pattern for 3-D is different in the US from that everywhere else, and these graphs highlight that difference. Note the balance of growth in 2-D and 3-D screens outside the US.

## VPFs Everywhere in Every Form

Europe  
Australia  
Asia  
US



Recoupment  
Non-Recoupment

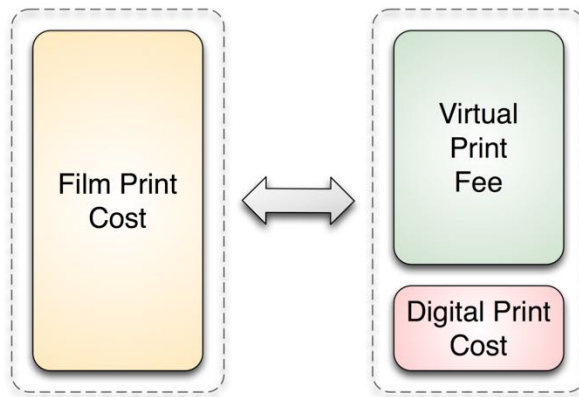
Deployment Entity  
Direct-to-Exhibitor

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3-D may have been the driver for digital cinema a few years ago, but today the driver is the wide availability of VPFs.

## VPF's Will Change



- Smaller VPF
- Shorter VPF Term
- Non-Recoupment

**Booking patterns will not change**

VPFs provide stimulus to convert, and with only 50% of the market converted, more stimulus might be sought. As digital cinema matures, the VPF structure undergoes changes, becoming simpler and less lucrative.

## Compliance Status

### **Products are hitting the target....**

- All projectors are now DCI Compliant
- Doremi Servers and Media Block, and Sony Media Block Are DCI Compliant



If the studios are going to pay, the equipment must meet their specification. The DCI spec must be met for equipment to earn a VPF. For the first time, manufacturers began to pass the DCI Compliance test over the past year. The studios are imposing deadlines to drive full compliance of all products by the end of 2011.

For exhibitors, this likely means equipment upgrades are needed, which should be discussed with your dealers and your manufacturers.



# Compliance Status

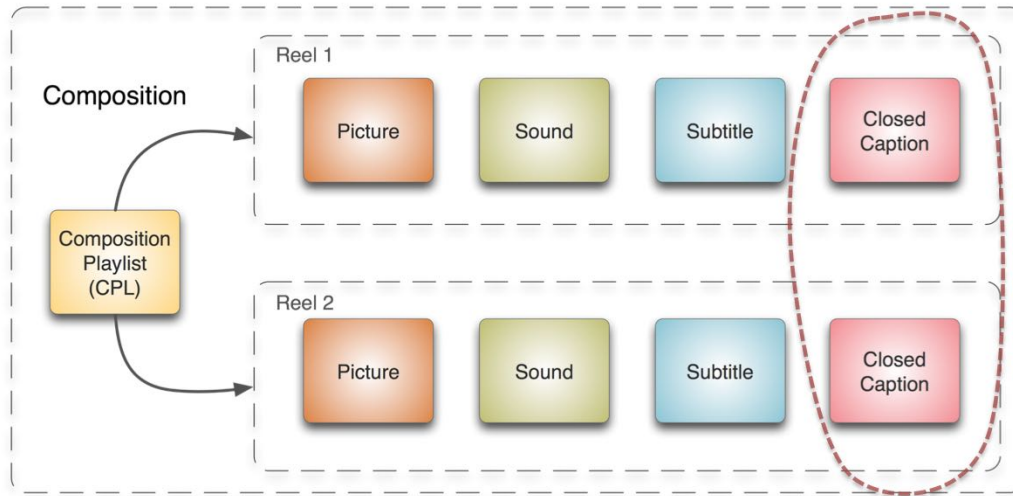
## **Some things have further to go....**

- Dolby, GDC, Qube servers still testing for DCI Compliance
- Studios still shipping Interop DCP, and not SMPTE DCP



SMPTE is the Society of Motion Picture and Television Engineers, which originates all digital cinema standards. To many, it is a surprise to learn that the standardized “SMPTE DCP” distribution format is not yet in use. Instead, the industry is using a format called “Interop DCP” that was originally meant as a temporary format while standards were being finalized. The transition to SMPTE DCP is also expected to take place in the coming year.

# Digital Cinema Package (DCP)



We talk about Interop DCP and SMPTE DCP, so it's useful to understand what a DCP is, and how it is unique to digital cinema.

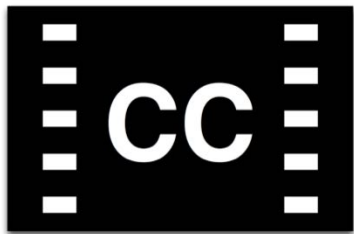
DCP stands for Digital Cinema Package. It represents the collection of files that are sent to the exhibitor. That collection of files may contain a partial movie or trailer, or several movies or trailers.

The movie or trailer itself is digitized in a form called the Composition, as pictured above. Each colored block in the diagram represents a separate digital file. Files are organized in temporal blocks intuitively called "reels." A Composition Playlist, also known as a CPL, instructs the system how to play the files.

The same Composition can be sent to thousands of sites. To play an encrypted Composition, however, requires a unique Key Delivery Message, or KDM, that will only work with a particular server and group of projectors during a particular engagement.

A major advantage of this structure is its flexibility. For example, Closed Captions were added after the first wave of standards were completed without breaking the Composition structure.

## Accessible Audio and Captions



- Accessibility Audio is standardized and ready
- Closed Caption delivery is standardized and ready
- Standards for “Plug-n-Play” operation of Closed Caption Systems is ready
- 3-D subtitles and captions are coming

One of the benefits of the Composition and DCP is that it makes it easy to add features at a later time. Because of this flexibility, open, non-royalty-based Closed Caption capability was recently added to the suite of digital cinema standards.

Digital cinema in general now supports full accessibility in a royalty-free and license-free manner. This includes an Assistive Listening audio channel designed to emphasize dialog, a Narrative audio channel that vocally describes the action of the scenes, as well as the traditional Open Caption text on screen, and now the Closed Caption text that can be displayed privately off-screen.

## Crystal Ball for Technology

***“The number of transistors incorporated in a chip will approximately double every 24 months.”***

—Gordon Moore, Intel Co-Founder, 1965



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After 45 years, Moore’s Law still holds true. Moore’s Law describes an exponential growth curve for technology. It impacts business models just as much as it predicts the growth of technology.

Content is now viewed in more ways than ever before. The impact of this is felt by studios as well as exhibitors. But just as Moore’s Law will impact the business models in this industry, it will also pave the way for new capabilities to entertain audiences.

## Technology Advances Should Bring...

- Lower cost of services
- Lower cost of ownership
- New capabilities



The goals of technology growth are simple. Keep these goals in mind as I go through the changes you are likely to see.

## Higher Frame Rates



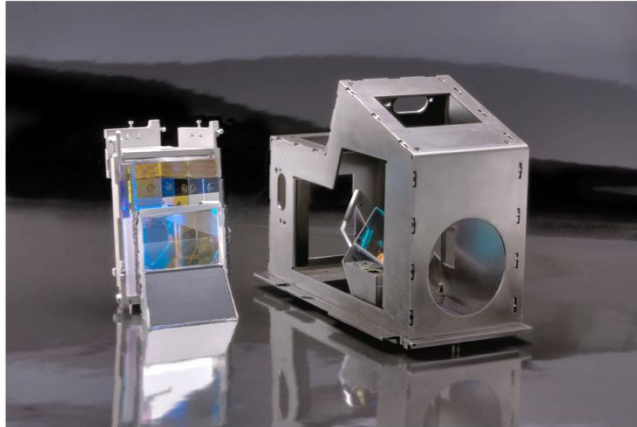
- Jim Cameron demonstrated stereoscopic 48fps (96fps) and 60fps (120fps) at CinemaCon
- Peter Jackson shooting *Hobbit* in stereoscopic 48fps

**Some projectors support 120fps**

Movies shot in higher frame rates are inevitable, thanks to improvements in digital cameras. For the foreseeable future, this should be thought of as the “70mm” version of digital cinema. The core “DCI compliant” digital cinema will remain unchanged for some time.

## Projector Innovation

DLP Prism  
vs  
Kodak Prism

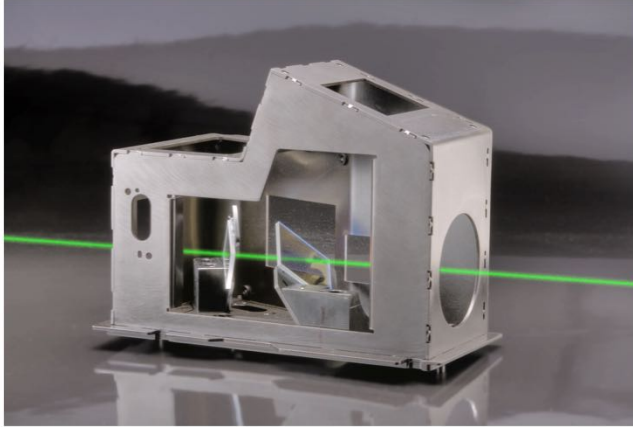


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Display technology is an area that receives significant investment in R&D. New projection technologies are included in this. Pictured above is the traditional TI DLP Cinema™ prism on the left, and a proposed, lower cost prism licensed by Kodak on the right.

## Laser Illumination



- Energy savings vs cost of technology
- Regulatory issues
- Measurement and reduction of artifacts
- Licensing

Laser illumination gets a lot of attention these days. Laser light is more expensive than xenon light, but cheaper to operate, trading operational expense for capital expense.

Many companies are working in this area, including Laser Light Engines, Kodak (laser light prism shown above), and all of the digital cinema projector companies. Laser light sources have many hurdles to cross before coming to market, most significant of which is the sheer economics of the technology. It could be 5-10 years before practical solutions emerge.



## Lower Cost Systems



**Off-The-Shelf Storage, Entire Server In Projector**

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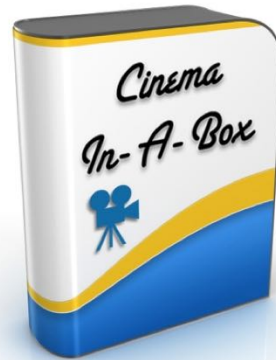
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Media blocks are the “video card” of the digital cinema server. It’s more secure to place the media block in the projector, as done by Sony, and now allowed by DLP Series 2 designs.

The next phase is to move the entire server into the projector. Sony already does this, but GDC was the first to show this for DLP Cinema projectors at CineEurope in June 2011.

## Complete Software Solutions

- SMS
- TMS
- Back Office
- Enterprise
- POS

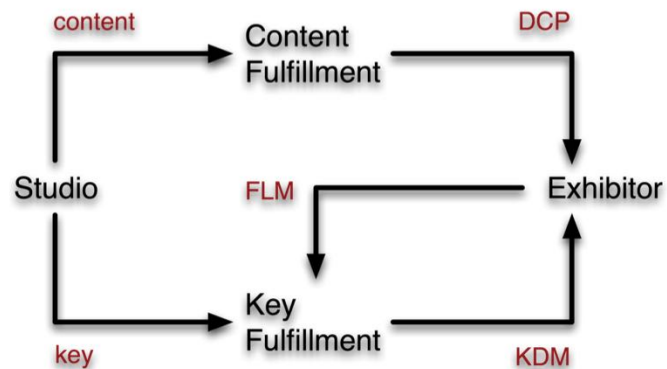


Just as all digital cinema-specific hardware will migrate into the projector, software will one-day emerge that provides out-of-the-box interoperability for all aspects of cinema operation.

# Security Management

**Security Key Management remains a major logistics hurdle for digital cinema**

**A movie having 5 x CPLs requires 5 x KDMs. 25,000 KDMs would be required to open on 5000 screens.**

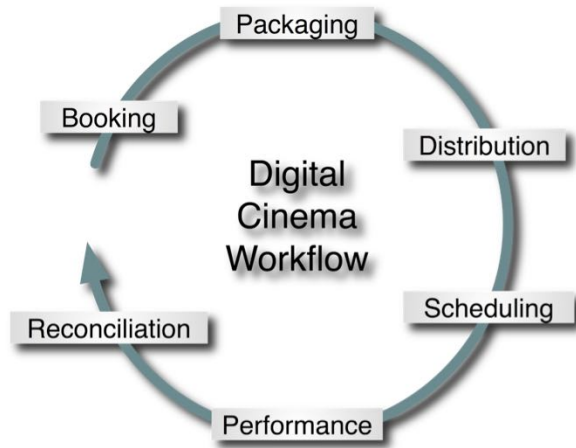


With 47,000 screens, key management is a monstrous task.

While the industry is successful in moving content and security keys to exhibitors, the industry still does not have a uniform, efficient method for managing keys. To generate the correct keys requires up-to-date knowledge of the equipment at the site. Today, this may require phone calls and emails, which is very costly on both ends.

A better way to collect information is through use of a Facility List Message, or FLM. One studio, Fox, is actively moving down this path. As this effort grows, it will become a major step towards bringing seamless security key management into the workflow.

## Improved Workflow



### **Uniform Identifiers Needed**

- Content Identifiers
- Distributor Identifiers
- Cinema Identifiers

Digital cinema brings with it the ability to improve workflow throughout the entire value chain, from booking to reconciliation. Agreements as to the use of common identifiers will help accelerate innovation in this area.

## Extended Sound

- Isono
- Auro 3D
- TMH 10.2



**Digital cinema supports 16-channels  
of uncompressed audio**

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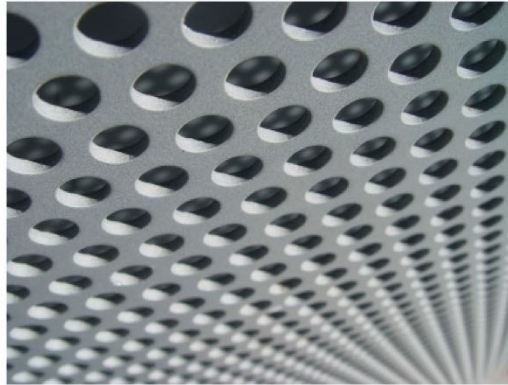
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After 12 years of intense focus on digital projection, it's refreshing to see the revived interest in extended sound systems. A core benefit of digital cinema is that it supports 16 uncompressed studio-quality sound tracks, out-of-the-box.

Specialized sounds systems have been demonstrated, as well, including Isono and Auro 3D. Disney introduced a new 7.1 sound format with several movies last year. We should expect to see further extensions of sound in the future.

## Improved Screens

**Are those perforations  
really necessary?**



While everything else is changing, why not take a closer look at screens?

Screen perforations exist to allow sound to travel through. But perforated screens lose valuable light, and the rectangular pixel pattern of the projector can beat against the rectangular perforation pattern, causing moiré patterns in some installations.

This topic is not new for high end home installations, where there is strong debate over the use of solid screens, perforated screens, or the newer woven screens. In appreciation of the problem, some exhibitors have installed solid screens in their auditoriums, with speakers surrounding the screen. If demand is there, screen technology is another area where changes could occur in the coming years.

# Thank You

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I hope you found this presentation to be informative.

My consultancy is focused on taking companies in the cinema industry to the next level. I keep the industry abreast of new developments and changes in my monthly mkpeReport online at <http://mkpeReport.com>. Archives more than 90 days old are free. It is the only publication of its kind that provides insightful analysis on new developments and will keep you current with ISDCF, SMPTE, DCI, NIST, and other activities that shape the digital cinema industry.