

Digital Distribution of Films in European Cinemas

Georg Jakob

EU-XXL Forum on European Film

Pécs, October 5, 2006

with very Special Thanks to:

Mercedes Echerer

and

Bernhard Kaindl

An Introduction

- Some Basics
- The Status Quo

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

An Introduction

Some Basics of Digital Playback in Cinemas

An Introduction

● Some Basics

● The Status Quo

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

- Distribution - getting the film to the theater:
 - Harddisk
 - Broadband
 - Sattelite
- Processing - feeding the images to the projector:
 - On a server
 - Locally
 - Processing power is needed anyway
- Projecting - throwing images to the screen:
 - Digital Light Processing (DLP, *Texas Instruments*; *Panasonic* for CNE)
 - Direct Drive Image Light Amplifier (D-ILA, JVC)
 - Laser Projectors (*Jenaoptik* for Planetaries; *Schneider* developed LDT - now owned by *TCL*, a chinese Holding with several Subdivisions for Digital Multimedia Distribution)

The Status Quo

An Introduction

● Some Basics

● **The Status Quo**

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

- Distribution - getting the film to the theater:
 - Harddisk are commonly used. In China, they even are brought by horse to some theaters.
 - Broadband is used, but only for downloading *before* screening. Due to infrastructure, streaming is not feasible yet. For acceptable quality, a download takes approx. 8 hours.
- Processing - feeding the images to the projector:
 - Done only locally, since streaming isn't available yet.
- Projecting - throwing images to the screen:
 - DLP by *Texas Instruments* is the current market leader, with shares up to 76%.
 - Among Laser Projectors, which generally deliver superior quality, LDT developed by Schneider is superior to all other technologies on the market (according to the German Federal Film Board).

An Introduction

Digitalization Effects

- Why Digital Film?
- Why *not*?

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

Digitalization Effects

Why Digital Film?

An Introduction

Digitalization Effects

● **Why Digital Film?**

● Why *not*?

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

The usual suspects:

- Cost savings on (all?) levels
- Maximizing (creative?) control: "*every pixel at your hands*"
- No degrading of prints - benefits actual distribution and long-term archiving
- Possible broadening of programs, e.g. live transmissions to cinemas

But what's the *real* essence?

- Tearing down entry barriers
 - Software is already available at reasonable prices (e.g. FinalCut, CinePaint).
 - As better Hardware becomes available, filmmaking - at least its technical part - will be available to everybody.
 - Examples for how it works: Free Software, Digital photography, Podcasts, Creative Commons...

Why not?

An Introduction

Digitalization Effects

● Why Digital Film?

● *Why not?*

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

What's holding it back:

- Security issues:
 - Digital material makes copying a lot easier - including illegal copying.
 - The Internet makes distribution a lot easier - including illegal distribution.
- Image quality of digital projectors:
 - Analog 35mm film resolution = 8192×4096 Pixel (8k)
 - Mid-/Long-term goal: 4096×2048 Pixeln (4k) at a reasonable cost
 - Available today: 2048×1024 Pixels (2k)

Neither of the latter two achieves colour depth and contrast comparable to 35mm film - except when using Laser projectors (which obtain nice results even at 1,4k). Laser projectors - the most competitive technology - are de facto excluded by the DCI. Strange, isn't it?

An Introduction

Digitalization Effects

**Filmmakers, Distributors &
Cinemas**

- Creative Choice
- Distribution Cost
- Cinema Owners
- Cost for Cinema Owners

The DCI System Specification

Summarial Interlude

Window of Opportunity

Filmmakers, Distributors & Cinemas

Filmmaking and Production Cost: The Creative Choice

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

● Creative Choice

● Distribution Cost

● Cinema Owners

● Cost for Cinema Owners

The DCI System Specification

Summarial Interlude

Window of Opportunity

- No prints during shooting: saves time and cost
- Editing and cutting right on the set possible
- Even various lightning setups show their final look immediately
- Rehearsing, shooting and post production flow into one: If you want that, you can be mean, lean, very fast and very cost effective.

"Film is like painting on a canvas in the dark; you don't see what you did until the next day when the dailies arrive. Now, you finally can see what you're doing."

–Robert Rodriguez (Once upon a time in Mexico, Sin City)

(But please take that quote with a grain of salt, since a.) it's from a Sony marketing document and b.) Sin City was shot in Black and White.)

Distribution Cost

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

- Creative Choice
- **Distribution Cost**
- Cinema Owners
- Cost for Cinema Owners

The DCI System Specification

Summarial Interlude

Window of Opportunity

- No need for prints anymore - that's where the costs are saved.
- But: These savings depend on infrastructure (Harddisk, Broadband, Sat) and who'll pay for that.
- Additional cost might be generated licensing technologies necessary for distribution: DCI compliance, DRM, etc.

Cinema Owners

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

- Creative Choice
- Distribution Cost
- **Cinema Owners**
- Cost for Cinema Owners

The DCI System Specification

Summarial Interlude

Window of Opportunity

- Need to buy new equipment. *Costly equipment.*
- Hybrid systems (analog/digital) are even more expensive.
- What exactly is the benefit for them?

Creating "Events" (e.g. live transmission of regional cultural/sports events) might be an interesting strategy - but for that, an *openly accessible distribution channel* is absolutely vital.

Cost for Cinema Owners

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

- Creative Choice
- Distribution Cost
- Cinema Owners
- **Cost for Cinema Owners**

The DCI System Specification

Summarial Interlude

Window of Opportunity

For a DCI-compatible equipment:

(at least) *EUR 80.000,-*

Among non-DCI-compatible systems, the minimum is:

EUR 40.000,-

Certain arthouse cinemas seem to get a discount of 50% for some of the non-DCI-compatible solutions:

EUR 20.000,-

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

- Some Basics of DCI
- More Flaws of DCI
- The Patent Issue
- Seizing the Market

Summarial Interlude

Window of Opportunity

The DCI System Specification

Some Basics of DCI

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

● **Some Basics of DCI**

- More Flaws of DCI
- The Patent Issue
- Seizing the Market

Summarial Interlude

Window of Opportunity

- Members: Disney/Pixar, Fox, Paramount Pictures, Sony Pictures Entertainment, Universal Studios, Warner Bros. Studios. MGM withdrew in 2005.
- Encoding format: Motion JPEG 2000 Codec.
- Resolution should be 4096x3112 Pixel (4K), but depending on equipment (source material, projector etc.) lower resolutions are accepted as an intermediate solution. Especially using 2K-projectors für 4K source material is allowed.
- According to the DCI, the standardization process is "finished", although the most important details on security, DRM and watermarking have yet to be agreed upon. Neither has DCI Compliance Test Procedure been defined. The standardization process is not really finished yet.
- Nevertheless, DCI systems are shipped to selected cinemas beginning in Q3 2006.
- A statment on DCI by SMPTE DC 28, an american (not an international) standardization body is to be expected for early 2007.

DCI is by Hollywood majors for Hollywood majors. Wich brings us to an interesting question: *Is the DCI SS an actual standard or just a franchise...?*

More Flaws of DCI

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

- Some Basics of DCI
- **More Flaws of DCI**
- The Patent Issue
- Seizing the Market

Summarial Interlude

Window of Opportunity

- At least two of the Hollywood majors are also in the hardware business.
- Apart from the majors, no other stakeholder - be it film makers, cultural institutions, non-US Producers etc. had the opportunity to participate.
- Film distribution is an extremely networked market. DCI doesn't take that into account. (Well, in a certain sense it does, but only to the benefit of the majors...)
- DRM: Is piracy *the* problem between distributors and cinema owners? *Do cinema owners really steal from their business partners on a regular basis?* Or is DRM in this case about something entirely different?
- *"Compliance with this document may require use of one or more features covered by proprietary rights (such as features which are the subject of a patent, patent application, copyright, mask work right or trade secret right)."*

The Patent Issue

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

- Some Basics of DCI
- More Flaws of DCI
- **The Patent Issue**
- Seizing the Market

Summarial Interlude

Window of Opportunity

- EP1323018: Protected content distribution system
- EP1331542: System for controlling the distribution and use of digital works
- EP1376309: Digital rights management system for protecting digital content
- EP1293864: System for controlling the distribution and use of digital works using digital tickets
- EP1334431: Method and apparatus for managing digital content usage rights
- EP1393230: Method and apparatus managing the transfer of rights
- EP1346307: Method and apparatus for dynamically assigning usage rights to digital works
- EP1390830: Method and apparatus for hierarchical assignment of rights to documents and documents having such rights
- EP1391801: Saving and retrieving data based on public key encryption
- EP1391802: Saving and retrieving data based on symmetric key encryption
- And *many* more - check for yourself at <http://www.epo.org>

Seizing, Closing and Locking the Market

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

- Some Basics of DCI
- More Flaws of DCI
- The Patent Issue
- **Seizing the Market**

Summarial Interlude

Window of Opportunity

1. DCI unnecessarily raises the bar on some important technicalities, complicating compliance. DCI is excluding solutions which are more cost effective and obtain better quality.
2. Potentially, how DRM is treated in the DCI is one more way of locking up the distribution chain: Theoretically a filmmaker would only have to upload his film to a cinema server. But what if the DRMed server only accepts DRMed content, using a technology owned by the majors?
3. DCI divides the market upon the majors, excluding everybody else - granting entrance only on their terms.
4. DCI expects local cinema owners to pay for the transition.

DCI reintroduces market barriers that are torn down by technology and is even adding new ones. It's the desperate try of the dinosaurs to draw the rest of the world into their tarpit of doom...

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

- Processing Power
- What does that mean?

Window of Opportunity

Summarial Interlude

Processing Power

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

- Processing Power
- What does that mean?

Window of Opportunity

Current projectors combine processing and projecting in a Blackbox. But since we're talking about digital stuff, let's ask a seemingly strange question: *What would it take to run such content on a "simple" PC?*

1. In Laptops, we now have Dual Core CPUs; in Desktop PCs 2x Dual Core is becoming more common; high-end Desktops already have Quad Dual Core.
2. For a 1,4k resolution of Motion JPEG 2000 we need at least an 8x Dual Core CPU Server at over 2 GHz.

So how long would it take to have such a processing unit at the price of an average PC?

Moore's Law: **Processing Power doubles every 18 months** - for the money you spend today on a certain amount of number crunching capacity, 18 months into the future, you'll get double the bang for the buck. Informatics expect this exponential growth to continue at least until 2010 before the physical limits of current processing technology are reached.

What does that mean?

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

● Processing Power

● **What does that mean?**

Window of Opportunity

Let's make some daring assumptions:

1. We'll have cheap processing hardware before 2010.
2. We should expect to see very competitive projecting technologies from China and India...
3. Broadband infrastructure is likely to increase, too.
4. Of course we still need the software to feed content to the projector - somebody needs to develop it.

Is that maybe why neither China, India or Brazil - all of them have government-funded digital cinema projects - seem to care that much about DCI? And why exactly should Europe?

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

- Sleeping Beauty?
- A possible solution
- Why not try it?
- Further Reading
- Further Reading

A Window of Opportunity for European Freedom

Sleeping Beauty?

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

● **Sleeping Beauty?**

- A possible solution
- Why not try it?
- Further Reading
- Further Reading

Waiting only and doing nothing
is *not*
an option!

If nothing is done, the DCI franchise is likely to become the de facto standard.
Prices fixed, no other solutions available.

If you only love to see the latest blockbuster at the nearest Cineplex, you might feel quite attracted to that...

A possible solution

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

- Sleeping Beauty?
- **A possible solution**
- Why not try it?
- Further Reading
- Further Reading

But if the necessary software is developed *now*, it is reasonable to build a system which

1. achieves a quality equal or superior to 35mm,
2. has security features based on Free Standards as an option,
3. could be shipped on a large scale before 2010,
4. and costs cinema owners *much less* than even today's cheapest solutions.

Why not try it?

An Introduction

Digitalization Effects

Filmmakers, Distributors &
Cinemas

The DCI System Specification

Summarial Interlude

Window of Opportunity

- Sleeping Beauty?
- A possible solution
- **Why not try it?**
- Further Reading
- Further Reading

DCI SS is rushed for some very good reasons - but they are not in *your* favour.

1. It's the software, s§#&\$!
2. Hardware prototypes are already available.
3. Free Standards - especially for encryption, for encrypted transmission, and for secure exchange of encryption keys - are available, too.
4. What would an antitrust lawyer think about DCI? Or should we maybe ask the European Commission?
5. Achieving an european solution would benefit filmmakers, distributors and cinema owners.
6. It might also be in the interests of european-based hardware manufacturers/vendors and Telecommunication providers.
7. It would also be in the interest of european cultural diversity - justifying public funding.

Why not just do it?

Thank you very much...

...for your kind attention!

For further information:

jack@unix.sbg.ac.at

<http://www.users.sbg.ac.at/~jack/>

<http://www.eu-xxl.at>

Further Reading

Digital Cinema Systems Specification V1.0, Digital Cinema Initiatives LCC, 2005.

Gibboney Huske/Rick Vallières, Digital Cinema: Episode II, Credit Suisse Equity Research, 2002.

Mike Katz/John Frelinghuysen/Krishan Bhatia, Digital Cinema: Breaking the Logjam, Booz Allen Hamilton Inc., 2002.

Brian McKernan/Roberto Rodriguez, Digital Desperado, Sony Cinealta Articles, 2002.

Birgit Niesing, D-Cinema: Bytes statt Film, Fraunhofer Magazin 2/2004.

Dirk Rüggenberg, Digitales Kino 2006, FFA - German Federal Film Board, 2006.

Further Reading

Screen Digest Report on the Implications of Digital Technology for the Film Industry, Departement for Culture, Media and Sport, Creative Industries Division (GB), 2002.

Inga von Staden/Beate Hundsdörfer, "Majors planen digital roll-out..." - Auswirkungen der digitalen Zukunft auf die Kinobranche, FFA - German Federal Film Board, 2003.

Peter Wilson, EDFC Technical Module 2003 Report, European Digital Cinema Forum, 2004.