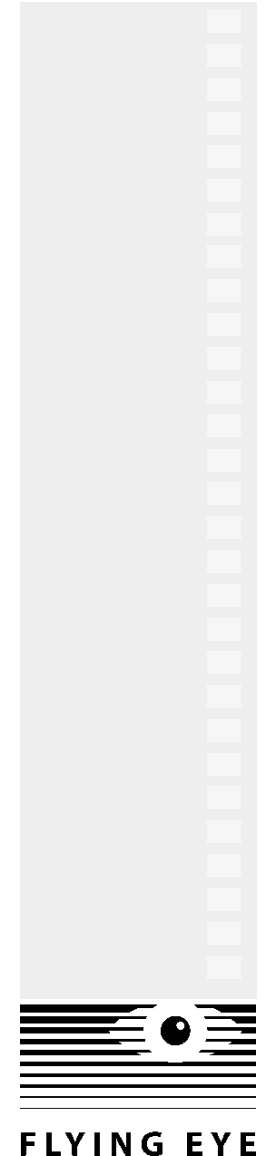

PRODUCTION- and PROJECTION for IMMERSIVE MEDIA

**Market Overview, Introduction Scenarios
and Business Models
for 3D Cinema and 3D TV**

**Kemal Görgülü
INSIGHT OUT, 26.03.2009**

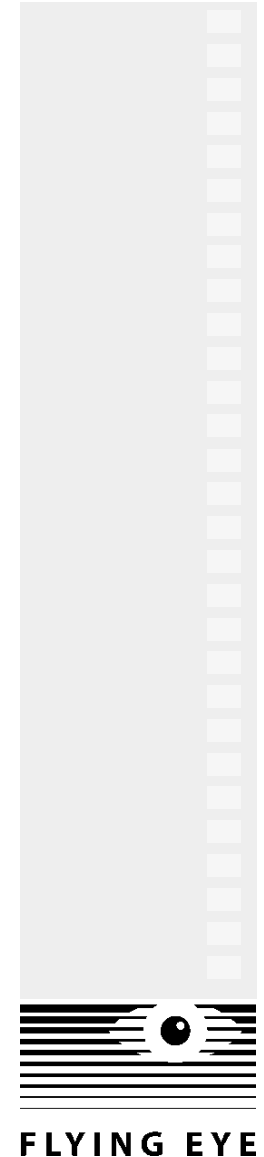
Agenda

- **Introduction**
- **Market Overview: Cinema**
 - Worldwide 3D installations in commercial cinemas
 - 3D Film Releases until 2011
 - Business Models
 - Introduction Scenarios
- **Market Overview: 3D-TV**
 - Introduction Scenarios
- **Market Overview: 3D-Equipment**
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- **Business Considerations/Final Remarks**



Agenda

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 - 3D Film Releases until 2011
 - Business Models
 - Introduction Scenarios
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Introduction

- **3D “waves” in the 50’s and 80’s failed**
 - Technological problems, especially in postproduction and exhibition (“eyestrain”, “sickness” ...)
 - Content availability, content “quality”

- **For a long period IMAX screens and theme parks (“4D”) were the only places for 3D exhibition**

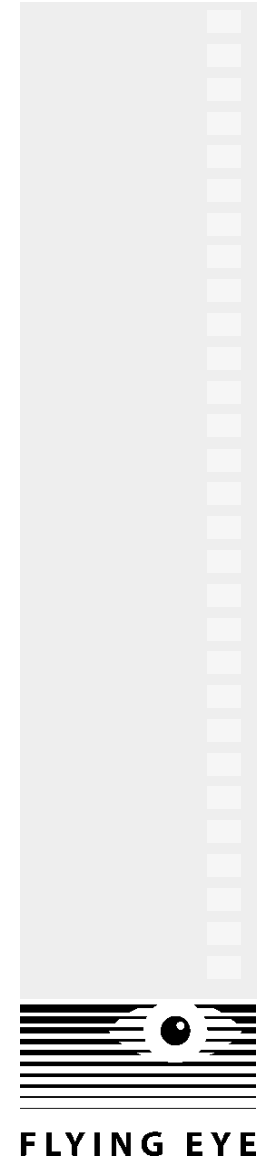
- **Technically poor 3D TV emissions have been shown during the last two decades over and over again**
 - Nothing which could have convinced the mass-market!

- **Introduction of digital production, postproduction and projection systems / technologies changed the situation dramatically**



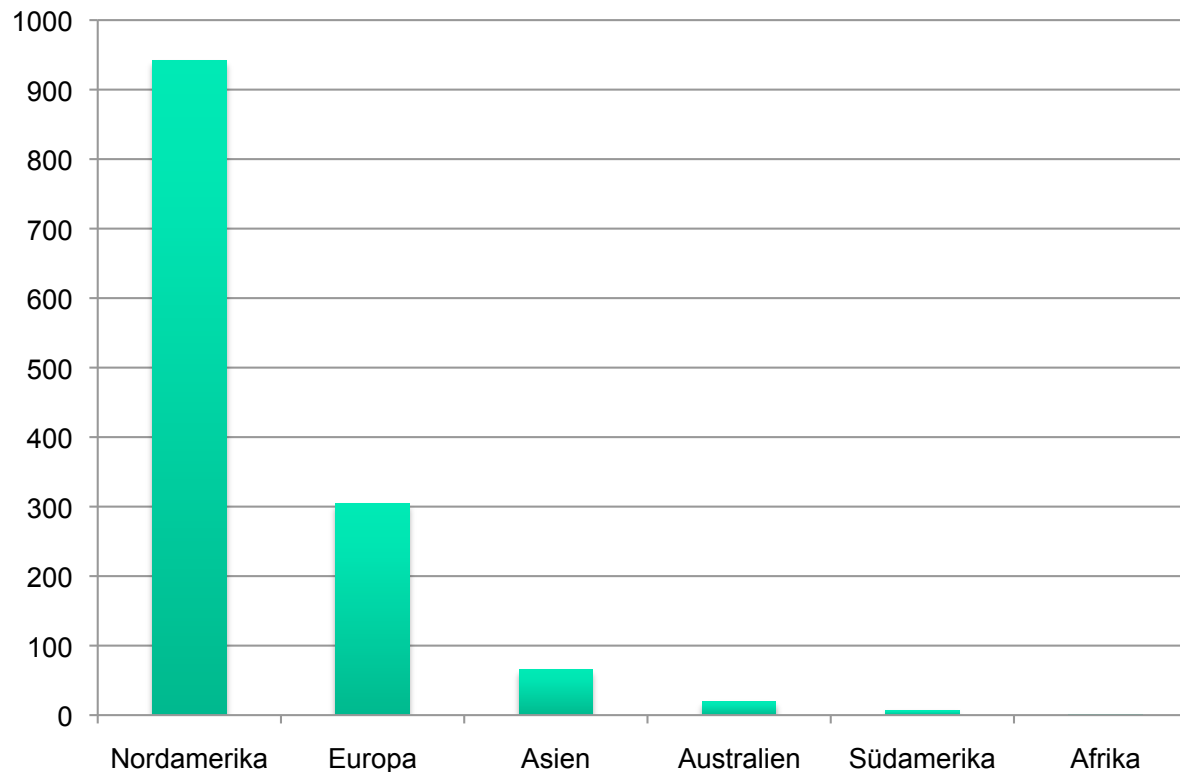
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 - 3D Film Releases until 2011
 - Business Models
 - Introduction Scenarios
- Market Overview: 3D-TV
 - Introduction Scenarios
- Market Overview: 3D-Equipment
 - Acquisition
 - Postproduction
 - Exhibition
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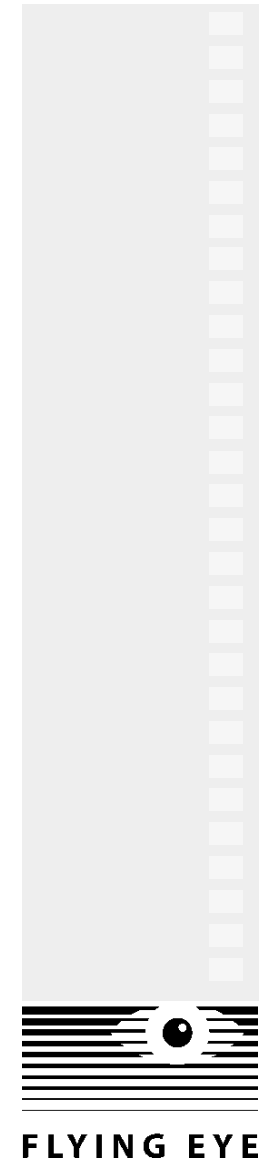


Worldwide 3D installations in commercial cinemas (Q4/2008)

- Most 3D cinema installations are in the US (approx. 950 installations)
- Europe: approx. 300 installations
- Asia: approx. 70 installations
- Worldwide 3D installations: approx. 1500 (out of approx. 7500 DCI-compliant D-Cinema screens)



Source: dcinematoday.com

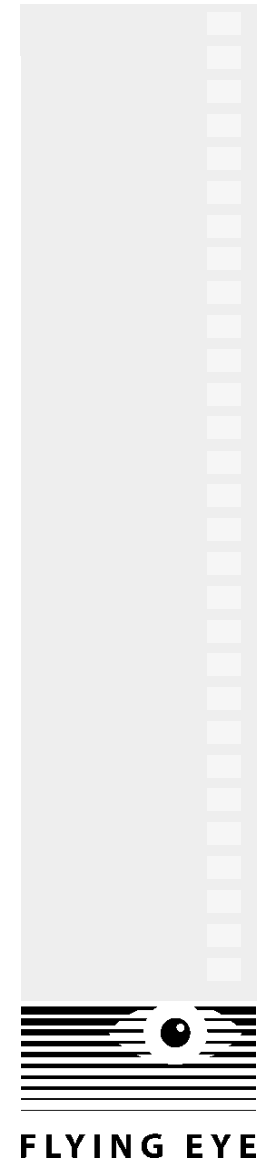


3D Film Releases until 2011



- 25 Films scheduled
- CGI dominates
- Hollywood dominates

Status	Originaltitel	Veröffentlichungs-Datum
Veröffentlichter Film	The Nightmare Before Christmas in 3D	24. Oktober 2008
Veröffentlichter Film	Bolt	21. November 2008
Veröffentlichter Film	My Bloody Valentine 3D	16. Januar 2009
Veröffentlichter Film	Coraline	6. Februar 2009
Veröffentlichter Film	Jonas Brothers: 3D Concert Experience	27. Februar 2009
Film vor Veröffentlichung	Monsters Vs. Aliens	27. März 2009
Film in Produktion	Up	29. Mai 2009
Film in Produktion	Ice Age 3: Dawn of the Dinosaurs	1. Juli 2009
Film in Pre-Produktion	Piranha 3-D	24. Juli 2009
Film in Postproduktion	G-Force	24 Juli 2009
Film in Postproduktion	Final Destination 4	21. August 2009
Film in Produktion	Cloudy with a Chance of Meatballs	18. September 2009
Film vor Veröffentlichung	Toy Story	2. Oktober 2009
Film in Postproduktion	A Christmas Carol	6. November 6 2009
Film in Produktion	Planet 51	20. November 2009
Film in Postproduktion	Avatar	18. Dezember 2009
Film in Produktion	The Princess and the Frog	25. Dezember 2009
Film in Pre-Produktion	Tintin	2010
Film Postproduktion	Toy Story 2	12. Februar 2010
Film in Produktion	Alice in Wonderland	5. März 2010
Film in Produktion	How to Train Your Dragon	26. März 2010
Film in Postproduktion	Alpha and Omega	16. April 2010
Film in Produktion	Shrek Goes Fourth	21. Mai 2010
Film in Produktion	Toy Story 3	18. Juni 2010
Film in Produktion	Guardians of Ga'hoole	23. Juli 2010
Film in Produktion	Mastermind	5. November 2010
Film in Produktion	Rapunzel	Dezember 2010
Projekt in Entwicklung	Cars 2	Sommer 2011



3D – Business Models for Cinema Exhibition

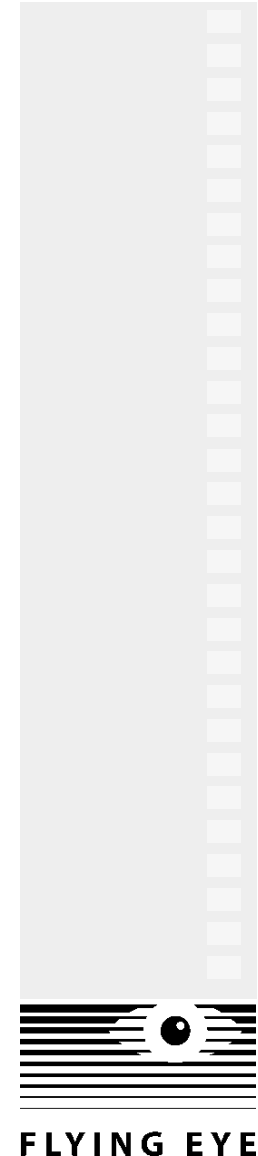
- **Digital cinema roll-out with accepted business models (e.g. VPF-model) is the basis for future 3D installation increases**
 - VPF Model is accepted in the market, but not the only business model
 - Germany and France are discussing/negotiating own business models (“Hunderter Modell”, “Digital Transition Contribution” aka DTC)
 - UK has started in the D-Cinema era with a publicly funded model
- **Investments for 3D Equipment comes on top of D-Cinema Installation costs (and exhibitors pay)**
 - Some integrators include 3D-packages for roll-out programmes
- **3D installations occur independently of organized roll-out schemes (exhibitors take the initiative)**



3D – Business Models for Cinema Exhibition

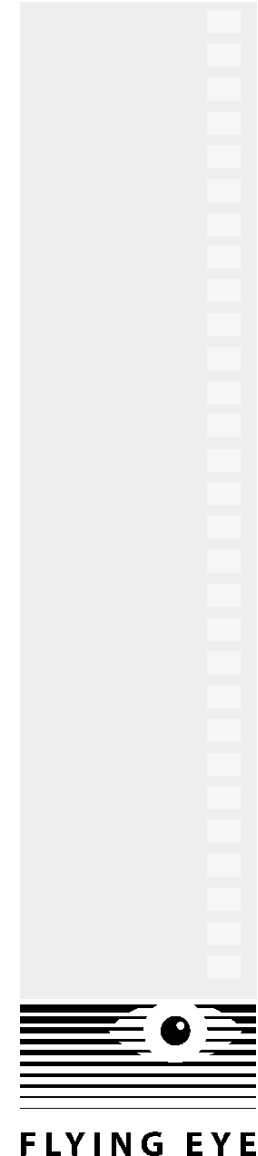
- **Business models depend on the 3D projection technology used**
 - Licensing Costs
 - Leasing of the equipment
 - Lease per film
 - Profit sharing (of each sold ticket)
 - Glasses are either provided by distributors or bought/washed by the exhibitor

- **Premium pricing models make the investment in 3D exhibition technology very interesting for the exhibitor**
 - Pricing based on fixed charge per ticket
 - Pricing based on flexible charges depending on content/event



3D – Business Models for Cinema Exhibition

- **Figures show that 3D plays a considerable part within the D-Cinema roll-out**
 - 3D offers an USP for cinema exhibitors
 - In contrast to “just” projecting digitally, 3D offers a really visible difference to the audience as well
 - Pricing models make 3D content exhibition in cinemas extremely interesting (up to 3 times more revenue/screen)
- **3D drives digital roll-out (or vice versa ?!)**

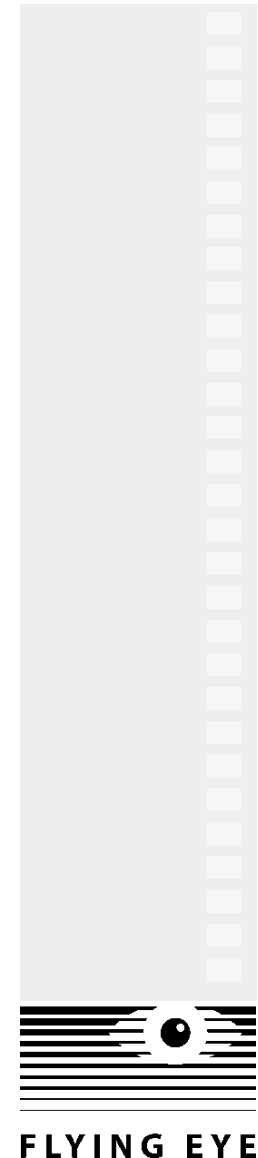


3D - Introduction Scenarios for Cinema Exhibition

- **Hollywood pushes 3D movies**
 - Planned/scheduled film releases show, that Hollywood is committed to current 3D “hype”
 - Supports D-Cinema business models (“VPF”-model)
 - Supports re-use of content (3D-versions of successful animation movies)

- **3D events for cinema exhibition**
 - Concerts & Sports
 - (Premium) pricing models which are interesting for both, the exhibitor and the audience

- **3D games for cinema exhibition**
 - Could be another alternative revenue stream for exhibitors (e.g. Asia)
 - There are interesting tests/offers in Europe (e.g. „Virtual Space Theatres“)



Agenda

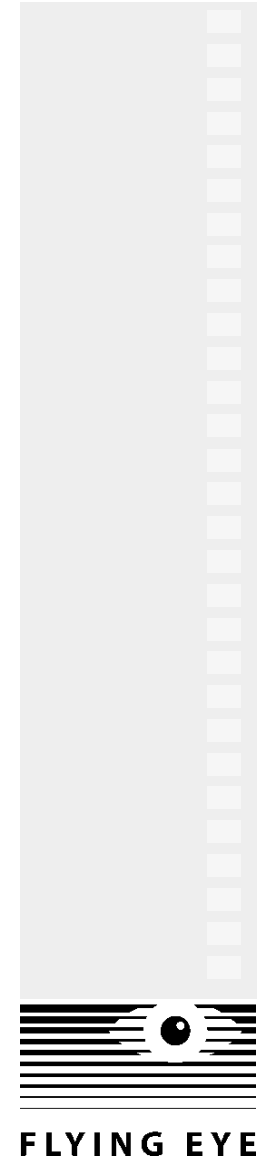
- Introduction
- Market Overview: Cinema
 - Worldwide 3D installations in commercial cinemas
 - 3D Film Releases until 2011
 - Business Models
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Market Overview 3D-TV

- **No 3D-TV standards at the moment**
- **Competing display technologies**
- **“3D-Ready”-TVs commercially available in the US (but not in Europe)**
 - **Content availability mainly on DVDs**

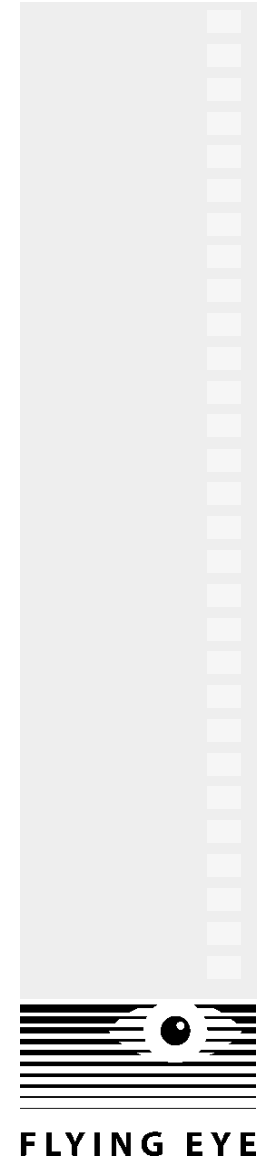
- **Tests show that 3D content production and distribution over existing broadcast-infrastructure is possible, but not mature**
 - **Mainly sports (NBA, ...)**
 - **Tests in sport area in Europe as well (IHF World Championship, Rugby, ...)**
 - **BSkyB and Quantel started 3D TV test-emissions in 01/2009**



Introduction Scenarios for 3D-TV

- **3D-TV as the next innovation after HD**
 - Application fits to technology move for displays (refresh rates, pixel increase, IP-TV)
 - 3D games as door opener for 3D @ home?
 - new forms of (reality-tv-inspired) 3D entertainment content?
 - 3D fun without glasses?

- **Availability of content is key factor for success**



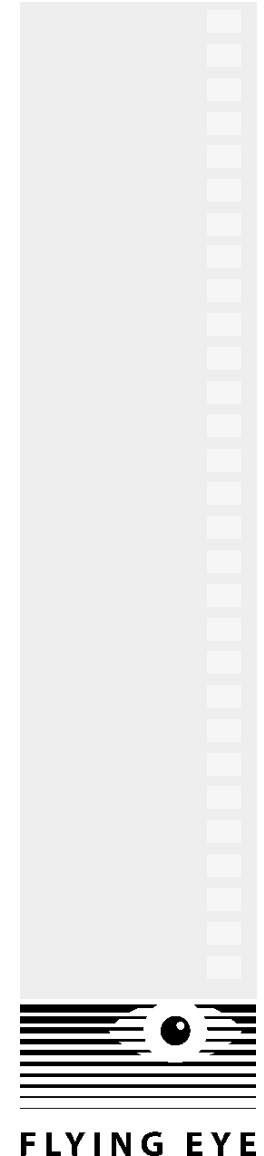
Additional Considerations for 3D-TV

- **3D TV experience has to be as good as 2D TV**
 - 3D function of TV sets should be disengageable

 - **Autostereoscopic 3D displays are still in a pre-mature state**
 - Will the consumer wait until auto-stereoscopic displays provide a comparable viewing experience at home?

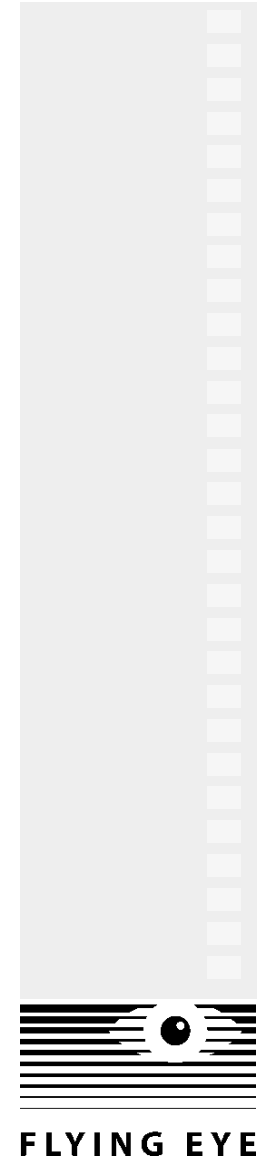
- **Acceptance of 3D for varying viewing conditions and a wide range of display sizes?**

- **What kind of content is desired by the mass market?**



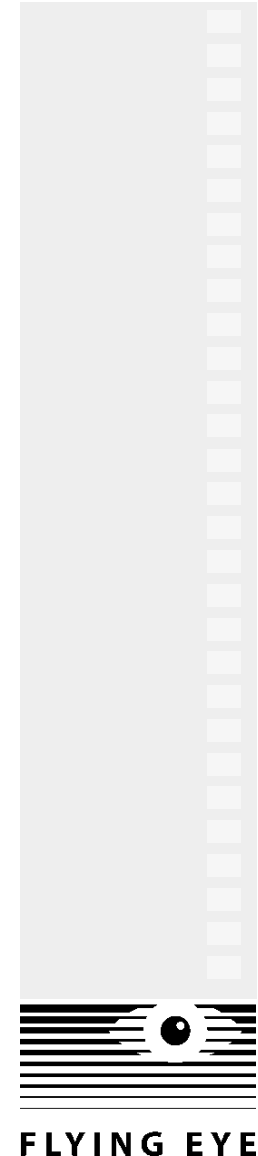
Agenda

- Introduction
- Market Overview: Cinema
 - Worldwide 3D installations in commercial cinemas
 - 3D Film Releases until 2011
 - Business Models
 - Introduction Scenarios
- Market Overview: 3D-TV
 - Introduction Scenarios
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 - Postproduction
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Equipment: Acquisition

- **Acquisition is either on film or with digital cameras**
- **Commercially available Rigs for 3D acquisition are still very, very rare (just one from P+S Technik)**
 - **But: there are very sophisticated Rigs developed by different companies which are available for rental**
- **Tools for setting up the correct on-set stereoscopic parameters are available resp. in development**
 - **Tools like stereoscopic calculators or STAN (-> cf. KuK presentation)**
- **Recording of the two signals is either done on videotape (HDCAM SR) or on disc/flash-based storage**
 - **Recording on HDCAM SR is currently the preferred way**

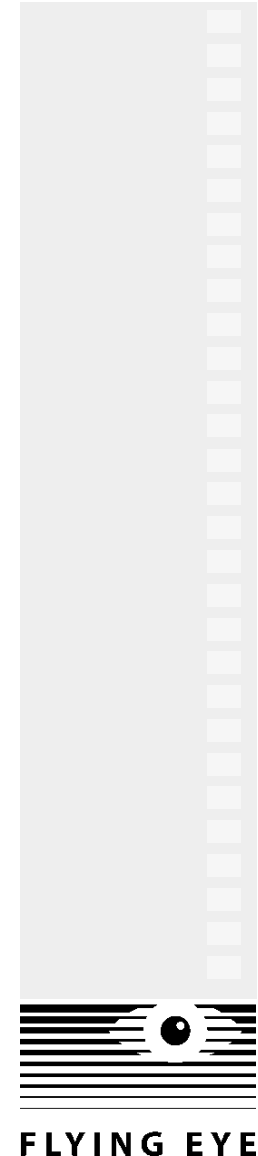


3D Equipment: Acquisition

- **Digital cameras are often used for 3D acquisition, they can be divided in 3 categories:**
 - Digital (“film style”) single sensor cameras such as ARRI D-21, Red One, SI2K etc.
 - “ENG style” 3-sensor-HD cameras
 - Mini/Micro HD cameras

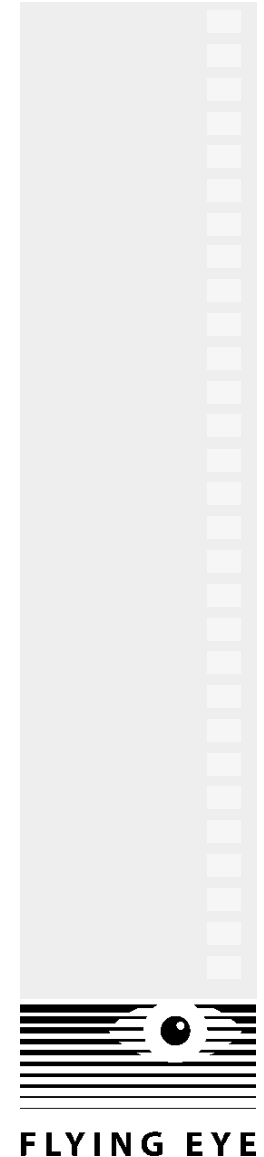
- **Digital single sensor cameras, such as ARRI-D21, Red One, SI2K etc. are introduced for a while and well accepted**
 - Workflows for on set storage and postproduction are proven for 2D, but still difficult for 3D (e.g. on set data management when recording on disc/flash based storage)

- **3-sensor-HD cameras are well established in the market**
 - Workflows for on set storage and postproduction are proven for 2D and (in some, but not all areas) for 3D



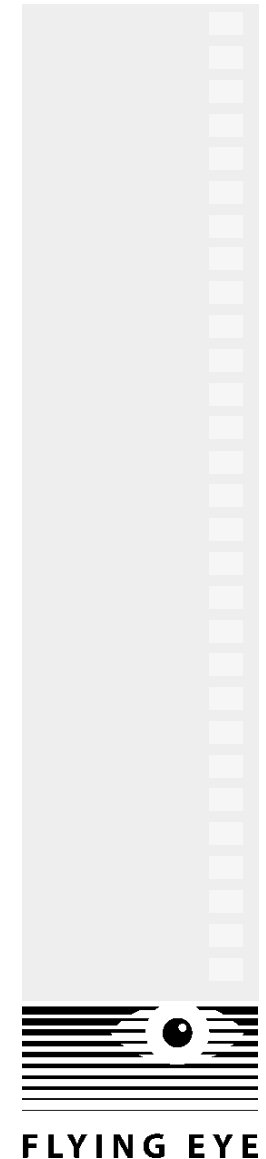
3D Equipment: Acquisition

- **Mini/Micro HD cameras are relatively new in the market**
 - Workflows are not established yet, but the use of mini/micro HD cameras for 3D acquisition seems promising in specific areas (e.g. video+depth)



Agenda

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 - Business Models
 - Introduction Scenarios
- Market Overview: 3D-TV
 - Introduction Scenarios
- **Market Overview: 3D-Equipment**
 - Acquisition
 - **Postproduction**
 - Exhibition
- Business Considerations/Final Remarks

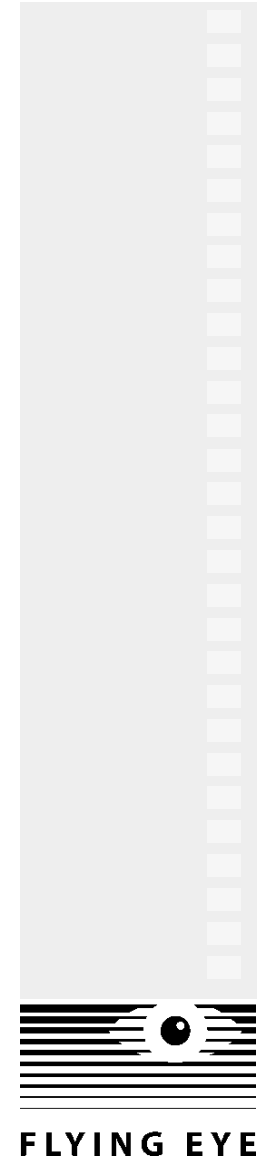


Equipment: Postproduction

- **Postproduction has two major challenges**
 - **Artistical challenges (e.g. speed and “jumps” of cuts, camera movements, etc.)**
 - **Technological challenges**

- **Technological challenges I (content-centric):**
 - **Color adjustment (e.g. minor differences of colors between the two cameras)**
 - **(“Artistical”) Color correction**
 - **Correction of stereoscopic parameters**
 - **Image corrections (e.g. removal of reflections)**

- **Technological challenges II (workflow-centric):**
 - **Lack of more sophisticated toolsets for correction of parameters**
 - **Exchange of files between different postproduction houses or systems (e.g. via naming convention)**
 - **Data management (where and how to store the masses of data?)**
 - **Fileformats**
 - **Metadata (...)**



Equipment: Postproduction

- **More and more manufacturers offer stereoscopic toolsets/ options for existing systems**
 - Editing Systems
 - Compositing
 - Grading
 - DI

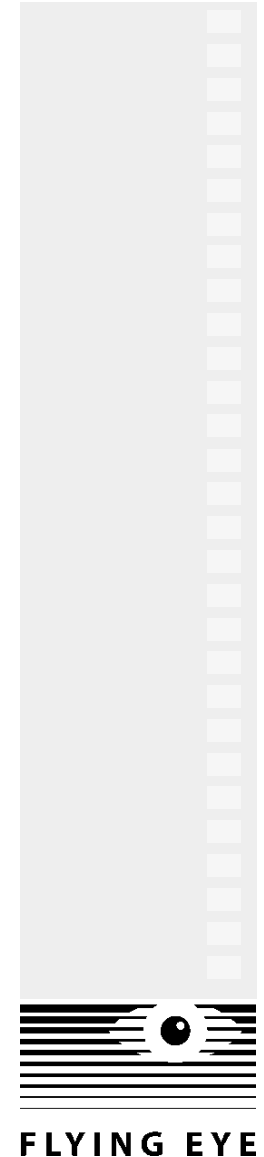
- **The tools get better, but the understanding of how to postproduce a 3D film is still not common knowledge**

- **2D – 3D conversion is also a topic/challenge within postproduction**
 - CGI-based sources are much easier to convert, especially if original data such as project files are still available
 - “Real-World” 2D – 3D conversion is a heavily manual, time and money consuming business
 - There are several companies who offer 2D – 3D conversions (In-Three, Dynamic Digital Depth, Stereo Pictures, Inition)



Agenda

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 - Business Models
 - Introduction Scenarios
- Market Overview: 3D-TV
 - Introduction Scenarios
- **Market Overview: 3D-Equipment**
 - Acquisition
 - Postproduction
 - **Exhibition**
- Business Considerations/Final Remarks



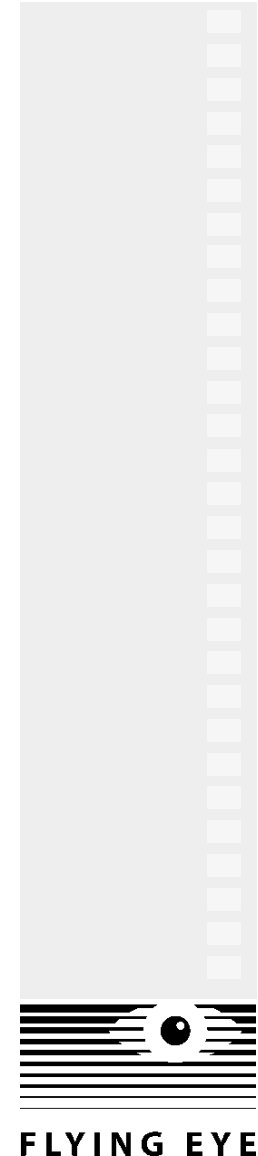
Equipment: Exhibition

- **There are different manufacturers/solutions for 3D cinema exhibition**
 - IMAX 3D
 - RealD
 - Dolby 3D Digital Cinema
 - XPAND
 - MasterImage
 - Sony

- **The competing manufacturers have different price and/or licensing models**

- **The different solutions have different technological and economical advantages and disadvantages (it's not easy to decide...)**

- **RealD is currently the worldwide market leader**

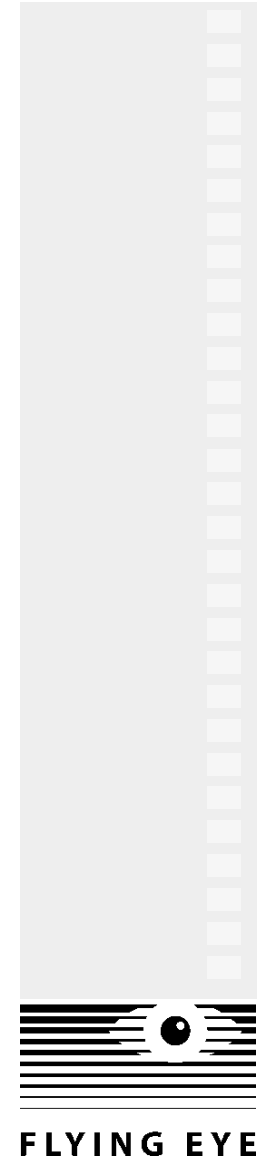


Equipment: Exhibition

	Solutions for normal screens		Solutions for silver-screens			
	XpanD	Dolby	RealD	IMAX	MasterImage	Sony
Technology	Polarisation	„wavelength triplet“	Circular Polarisation	Polarisation	Circular Polarisation	Polarisation
Glasses	Active polarised	Passive; colour filter	Passive polarised	Passive	Passive polarised	Passive polarised
Multiplex	Time multiplex	Time multiplex	Time multiplex	Time multiplex	Time multiplex	At the same time
Hardware	Infrared emitter (for glasses sync signal)	Colour Wheel within optical path of the projector; Server with special colour processing	External, active polarisation filter ("Z-Screen")	"IMAX Image Enhancer", special Doremi Server	External, active filter wheel,	special adapter and Sony optics necessary
Remarks	Glasses are relatively expensive; Batteries have to be changed; Glasses have to be washed after each screening	Brillen werden aufwendig hergestellt und sind deswegen relativ teuer; Brillen müssen nach jeder Vorführung gewaschen werden	Cheap glasses, market leader for 3D exhibition	2 Christie 2K DLP projectors; roll-out didn't take place yet	MasterImage is mainly operating in Asia; there are no/few installations in Europe or the US	60p at 2x2K projection (recently announced)

Agenda

- Introduction
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 - Business Models
 - Introduction Scenarios
- Market Overview: TV
 - Introduction Scenarios
- Market Overview: Equipment
 - Acquisition
 - Postproduction
 - Exhibition
- **Business Considerations/Final Remarks**



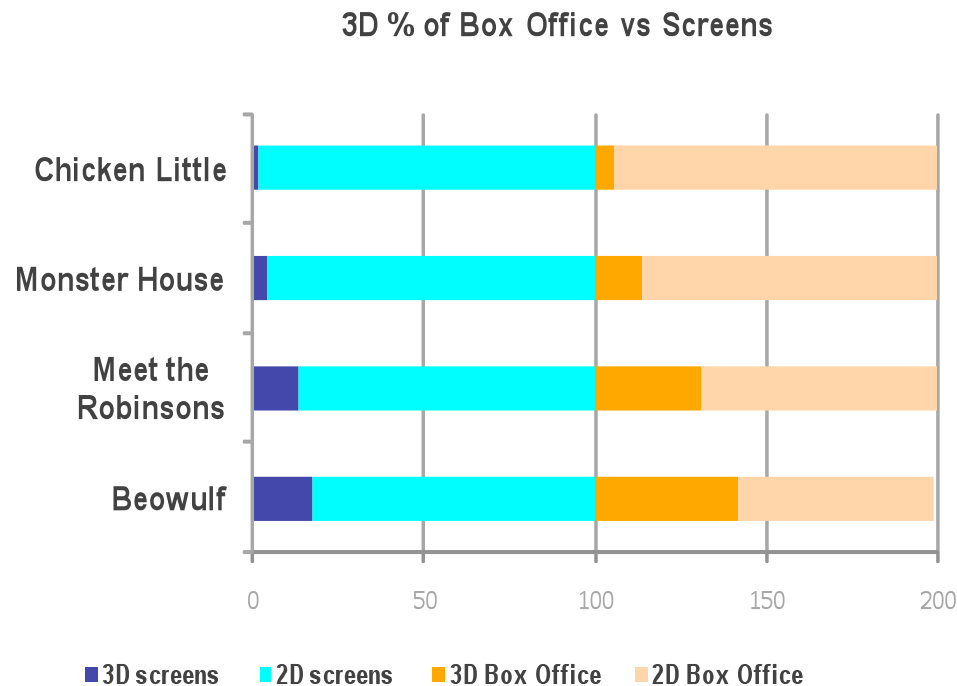
3D – Business Considerations for Cinema Exhibition

■ Cost compared to 2D digital

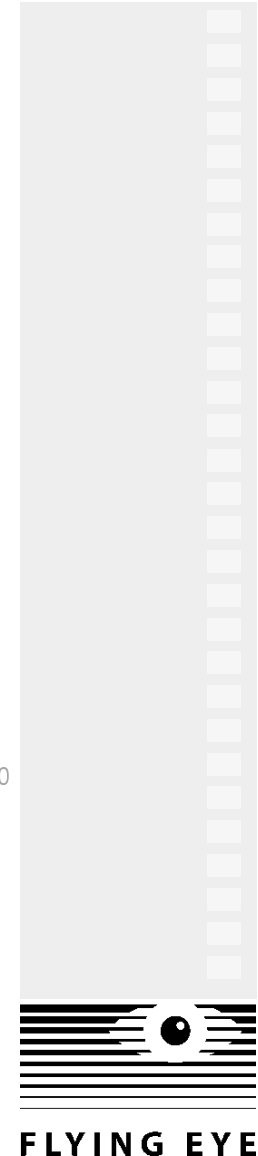
- Reasonable higher production cost
- Comparable distribution cost (surplus <10%)
- Reasonable higher exhibition investment cost (30%) and slightly higher operating cost

But.....

- Significantly increased box-office by now! Will this stay in place?



Source: Screen Digest, Showest08

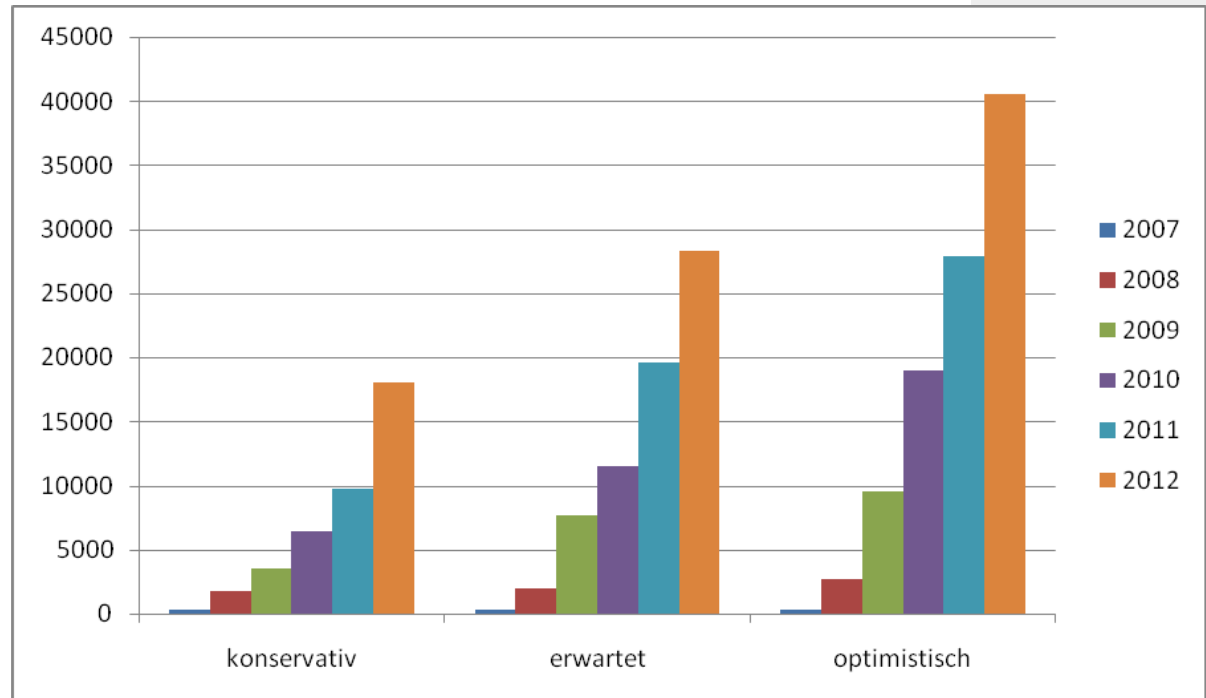


3D – Business Considerations for 3D @ home

■ Cost compared to 2D digital

- Comparable distribution cost (surplus <10%)
- Presentation cost depending on display technology:
 - 3D-ready displays for use with glasses with marginal additional cost
 - Autostereoscopic displays with significant higher cost

■ Sales Forecast for 3D (ready) TV-Sets is quite promising!

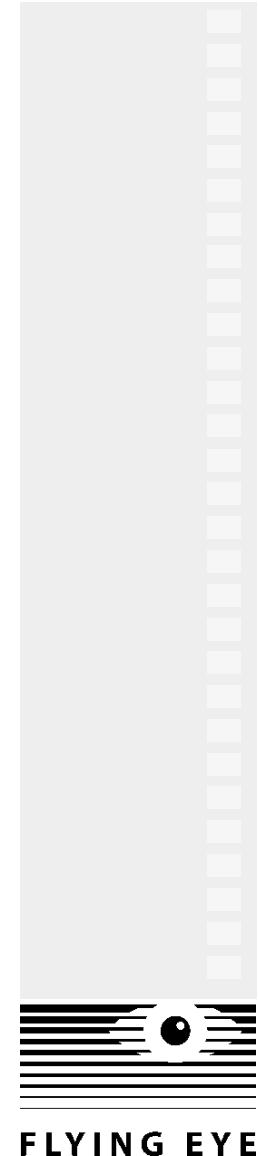


Forecast: Sales of 3D-ready and 3D-TV-Sets (Source: Insight Media, 2008)

Final Remarks (3D Cinema)

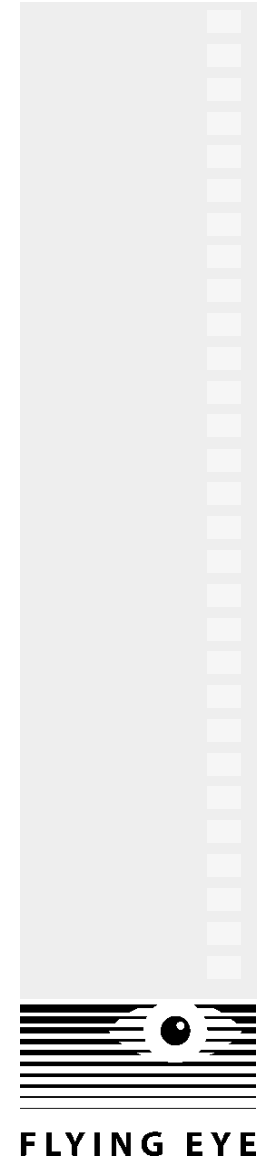
- **Since DCI specifications Digital Cinema is an ongoing worldwide reality**
- **Content producers make efforts to guarantee more content availability**
- **Audience seem to highly appreciate 3D cinema**
- **Exhibitors are willing to invest**

- **But: Current 3D cinema installation basis is not “Blockbuster-Ready” yet**
- **The current economical situation seems to slow down the market**
- **Forecasts of how fast 3D cinema exhibition reaches a critical mass is under current circumstances difficult**



Final Remarks (3D-TV)

- **3D-TV is still far away of becoming a mass market reality**
- **Standardization bodies and manufacturers are making lots of efforts in order to make 3D-TV happen**
- **There seems no doubt that 3D-TV will be the next “big thing” after overall HDTV implementation**
- **It will be very interesting to evaluate future progress in the 3D-TV area on both, the technological and content side!**



THANK YOU!

