

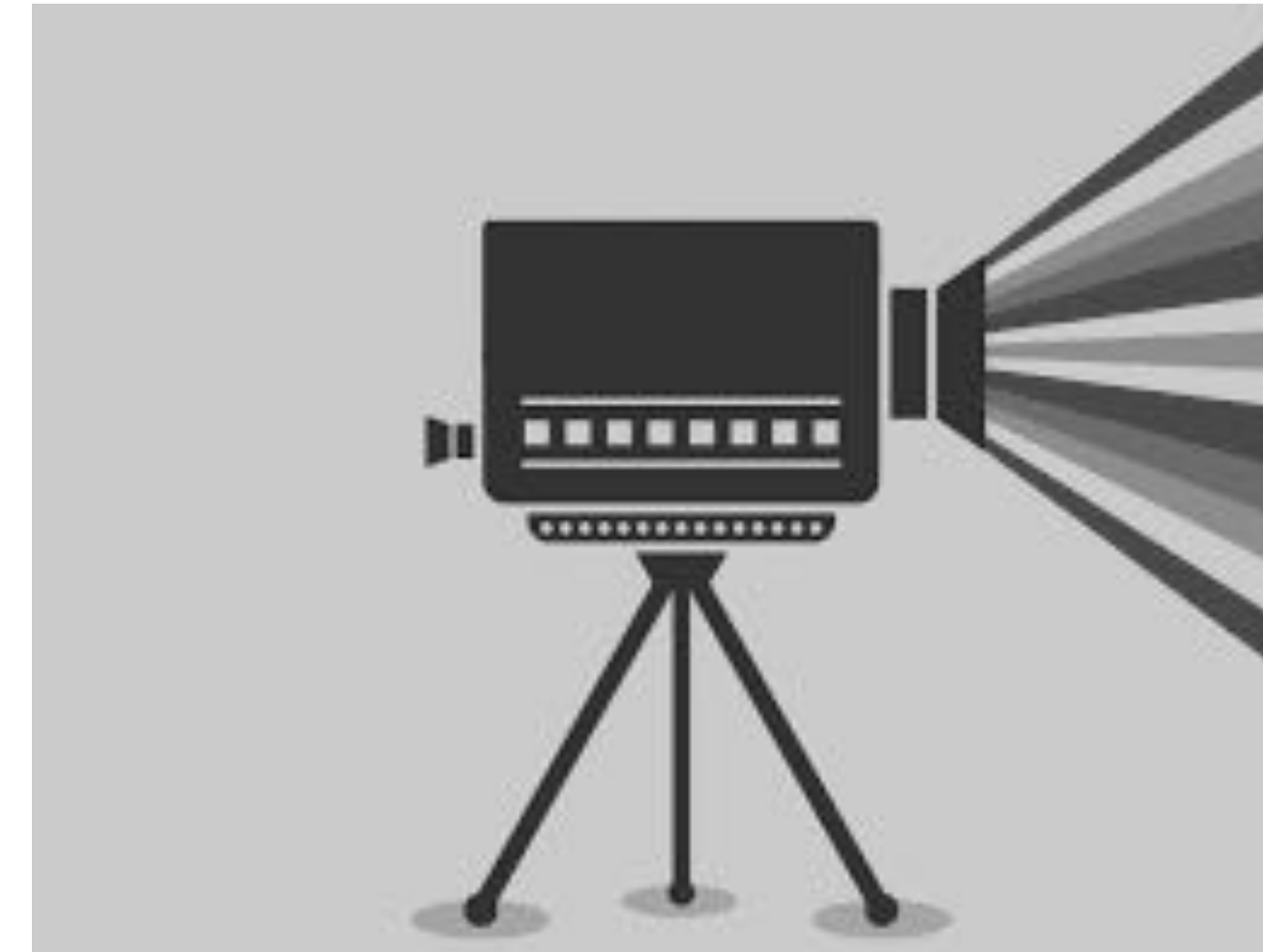
2018 QLED &  
Advanced Display  
Summit in Hollywood

# HDR Cinema in 2018

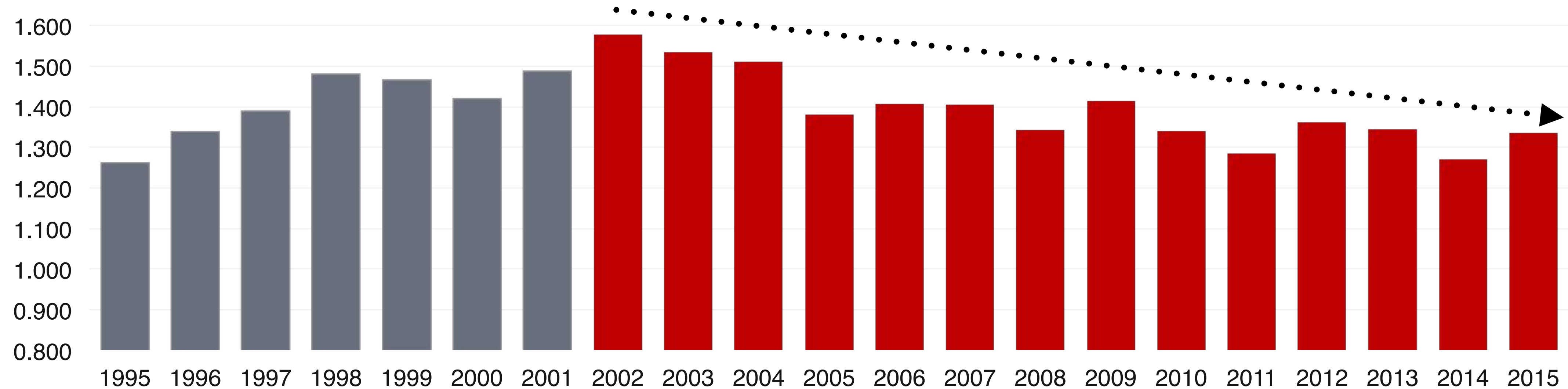
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28 June 2018

# HDR Cinema is a new format

- i.e., \*not the same\* as SDR Cinema.
- Requires new thinking.
- Or no thinking.
- That's what this presentation is about.



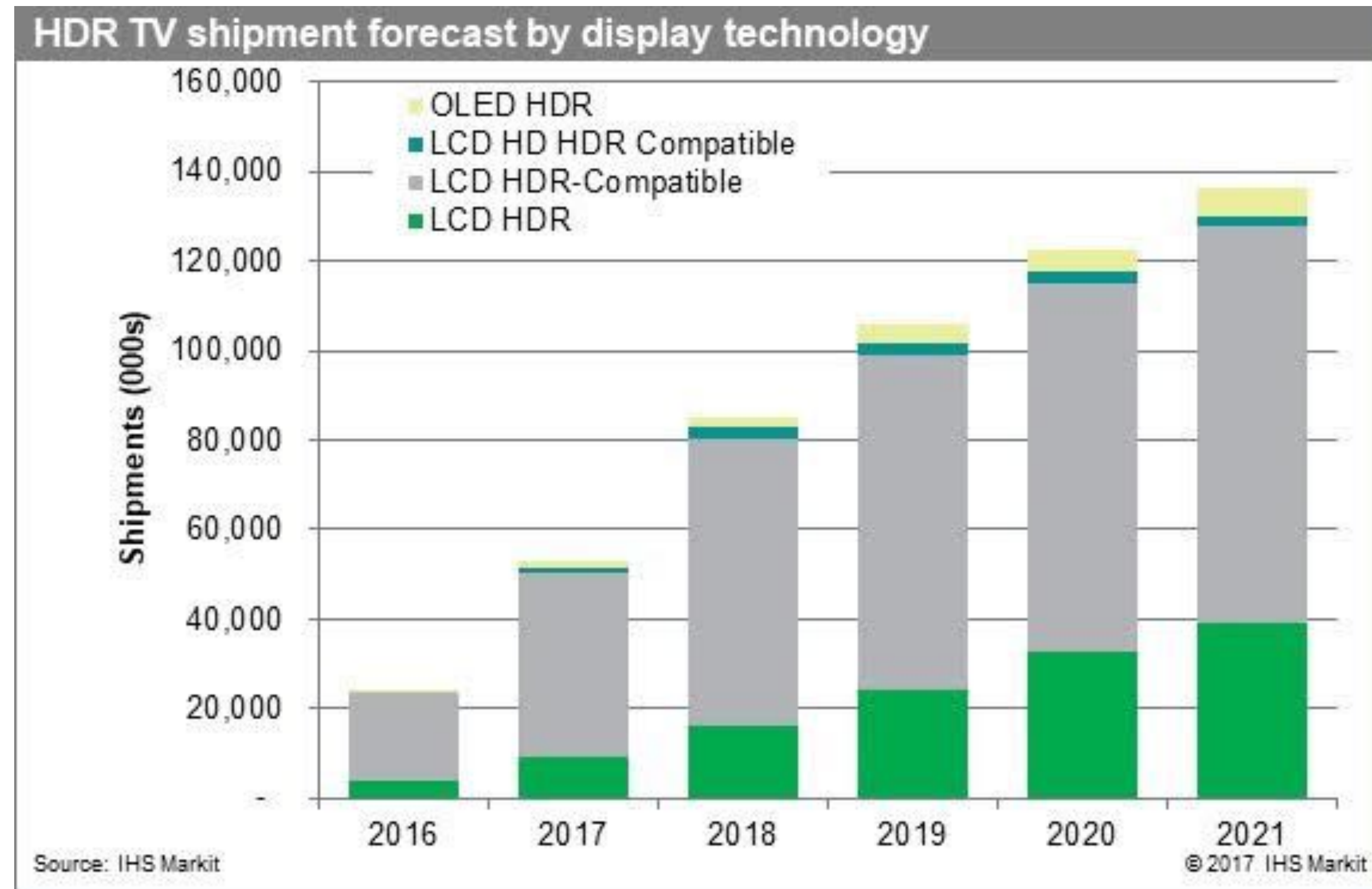
# Can cinema afford it?



Theatrical Attendance (in billions)

Box Office sustained through rising ticket price - diminishing elasticity in pricing for HDR

# Can cinema afford to ignore it?



**Audience expectations are changing.**

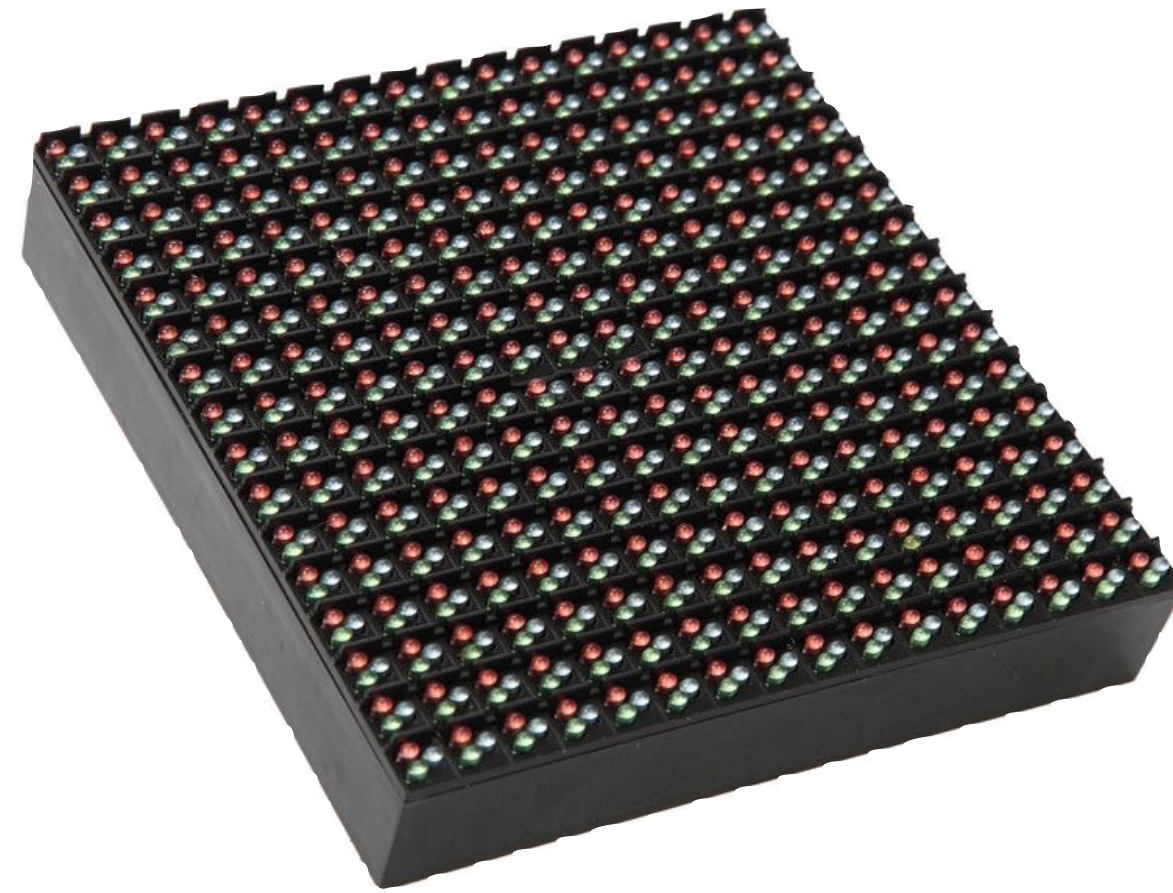
# The market is ripe

- Virtual Print Fees expiring, equipment loans retired.
- Cost of maintenance going up as equipment ages.
- HDR is emerging in the home...raising audience expectations.



**Exhibitors will invest in new equipment - but which equipment?**

# More than one HDR display technology



- Direct-view LED
- Light steering in projectors

# Will LED manufacturers cater to this market?

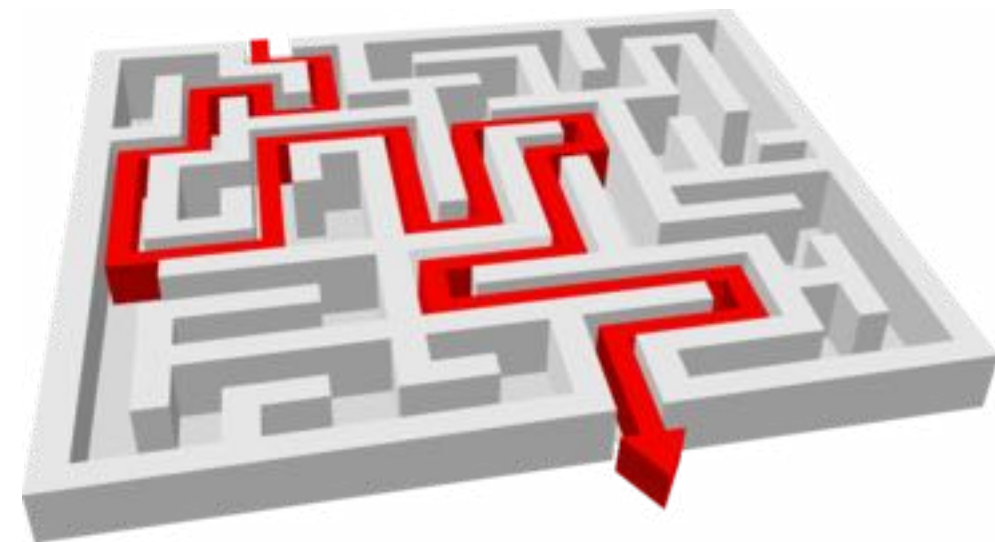
160,000 cinema screens worldwide

If 10% were to convert to HDR  
10% => 16,000 screens  
@ US\$500K per screen = US\$8B

If 2% were to convert to HDR  
2% => 3,200 screens  
@ US\$500K per screen = US\$1.6B  
over 5 years => US\$320M / year

In comparison, worldwide LED display market ~ US\$5B in 2016

# Many technical challenges



- New EOTF is needed. DCI specifies gamma 2.6 for SDR.
- HDR requires higher frame rates than 24 fps.
- Image codestream bitrate: DCI specifies 250 Mb/s. Is this good enough for 4K HDR at higher frame rates?
- Color gamut = DCI P3. Appears to be agreement to sustain this.
- But color volume will vary across the cinema footprint due to a variance in peak white. How will this be managed?

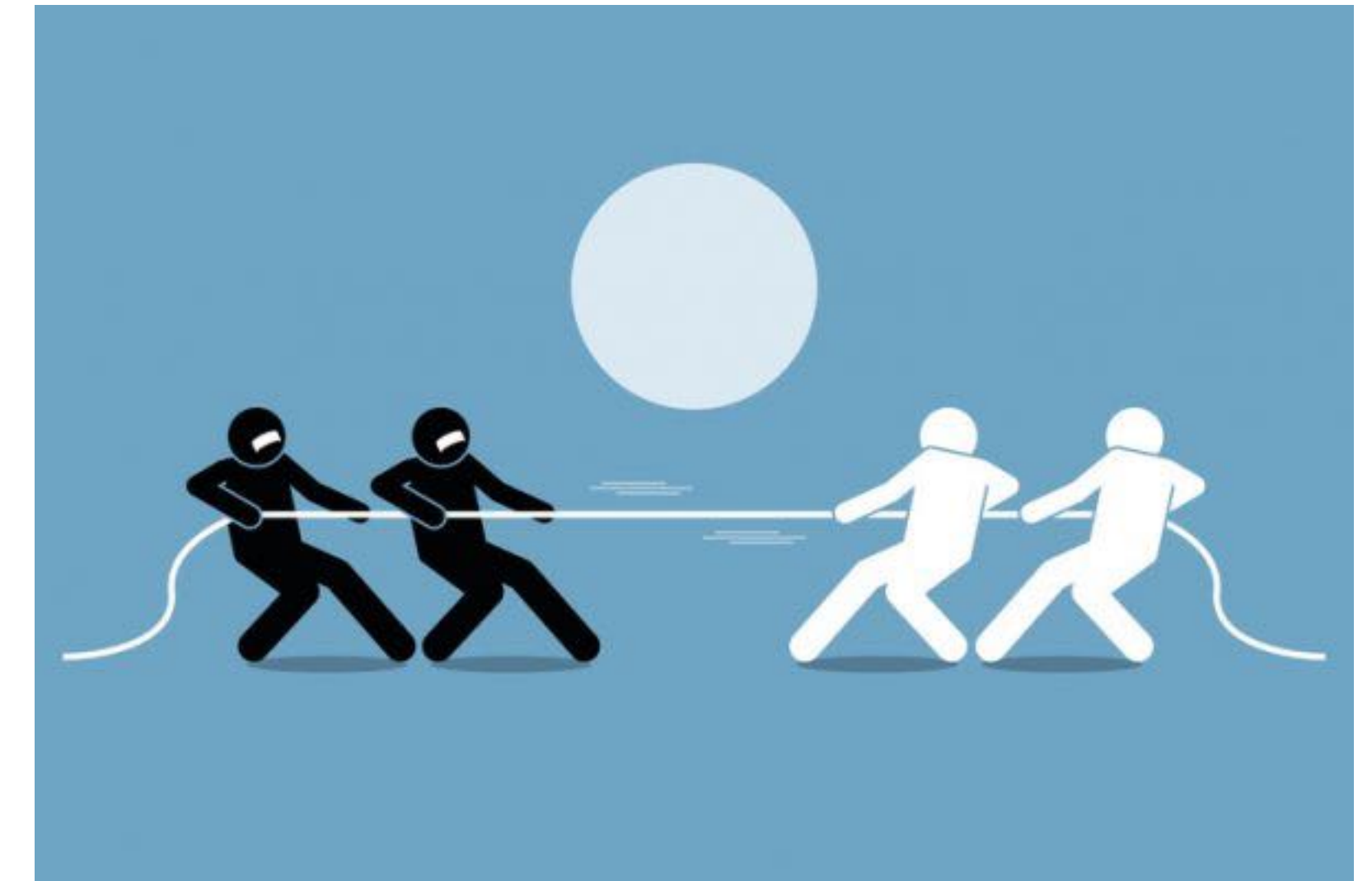


# Uniform HDR distribution is a challenge

- Cinema standards have a poor track record.
  - SMPTE DCP is 9 years old with 10-20% worldwide market penetration.
  - SMPTE immersive sound in committee for 5 years...and counting.
- Historically, innovation in cinema is driven by technology providers with no concern for standards.
- Even with standards, who would oversee compliance?

# The studio dilemma

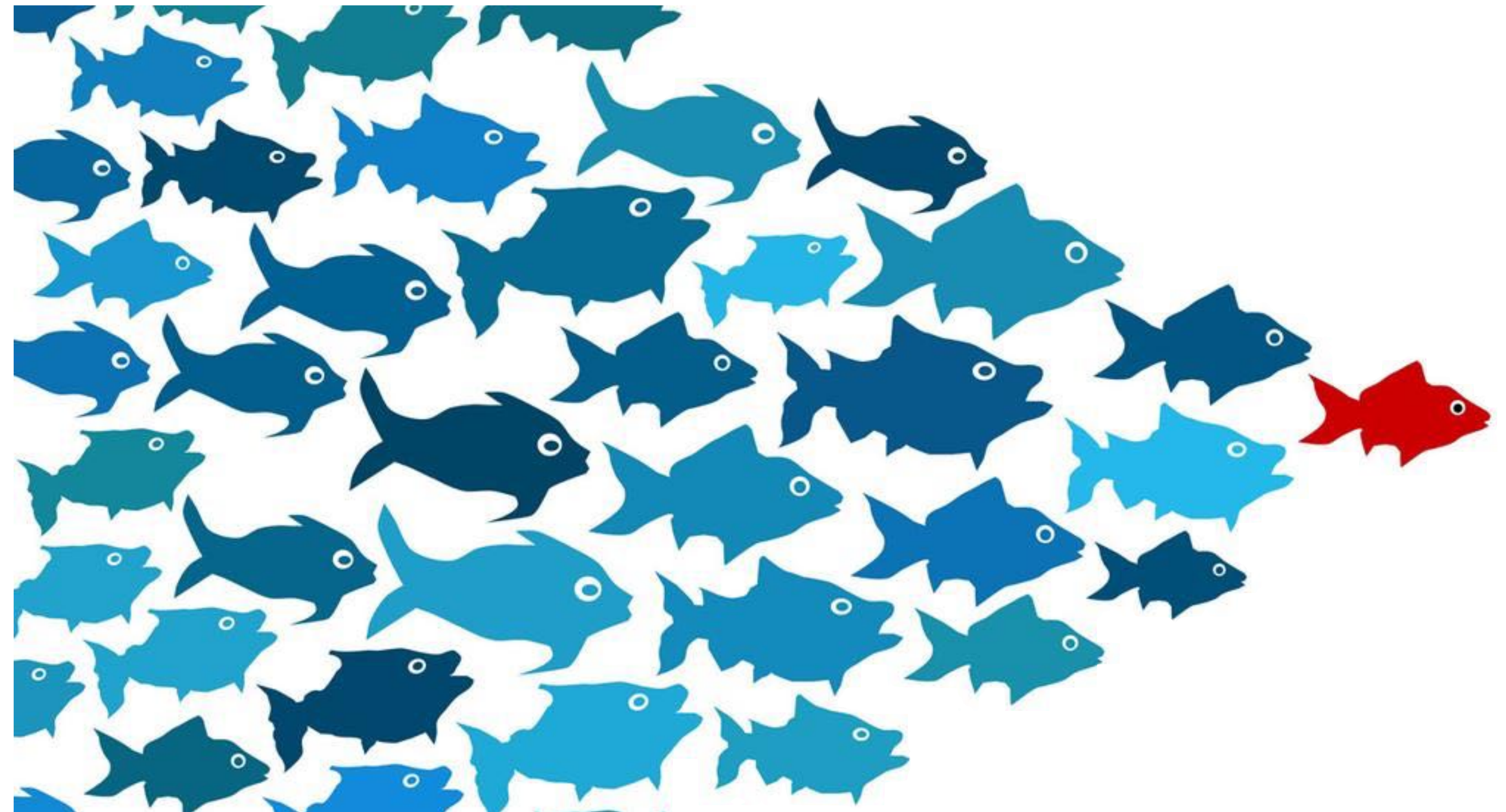
- Technical execs can only exert control by diminishing revenue.  
“If it doesn’t do xyz, we won’t ship the movie.”
- Distribution execs are paid to maximize revenue.



Hmmm...wonder who wins?

# The leadership dilemma

- Dolby: the leader in HDR with 40+ years in cinema, but how to lead mainstream cinema without diluting the Dolby Cinema brand?
- Samsung: ~1 year in cinema: just learning the market, no cinema brand.
- Sony: in cinema 25 years...?
- LG: ?

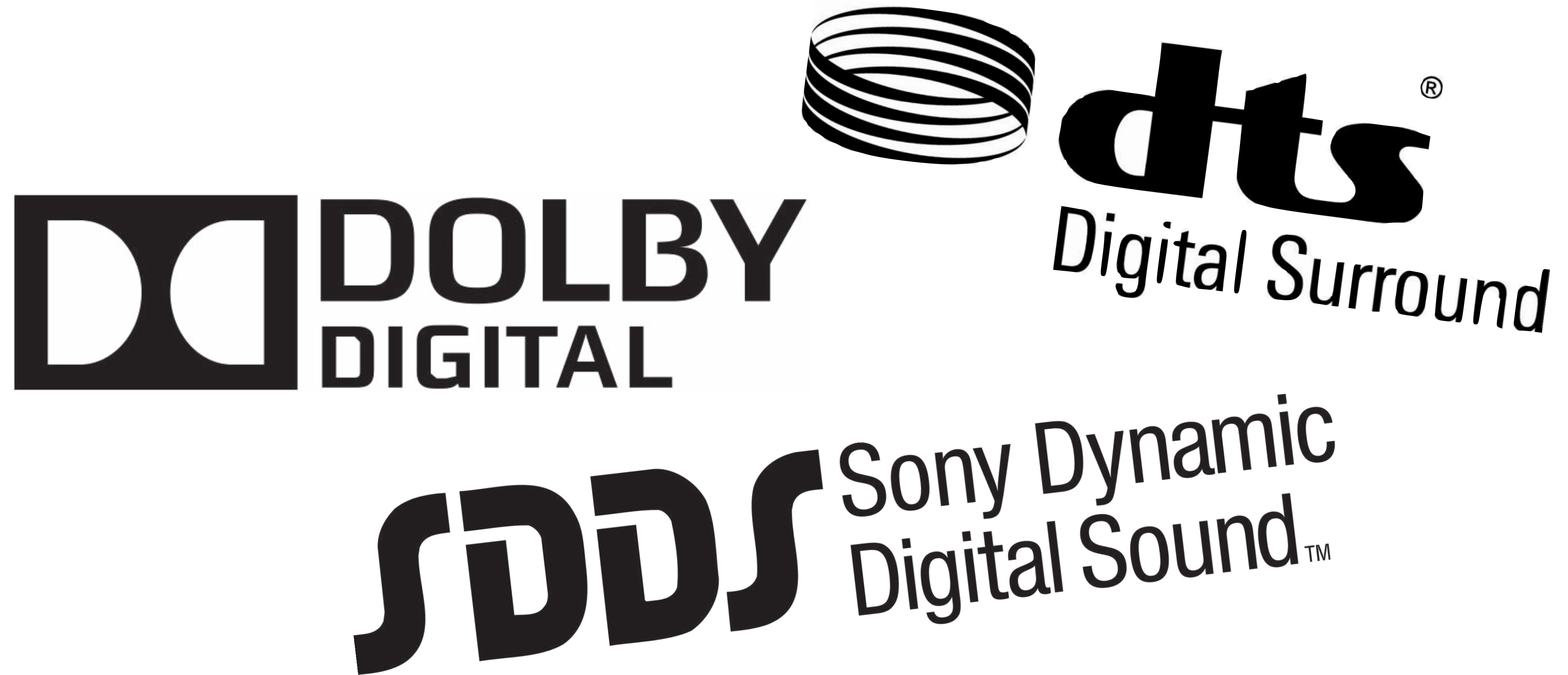


# The logical but maybe impossible 1st step: StEM 2.0



- Explore HDR at higher frame rates.
- Explore methods for single distribution with variance in exhibition color volume.
- Explore image codestream bitrate.
- Who will finance the project?
- Who will own the rights?
- What will be the license terms?

Is cinema about to repeat the 90's?





Or will someone take the 1st step?

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