Massive Data in the New Hollywood

A Crisis of Exascale Proportions

26th IEEE (MSST2010) Symposium on
Massive Storage Systems and Technologies
Robert Eicholz
Sr. VP Technology / Corporate Development
EFILM LLC
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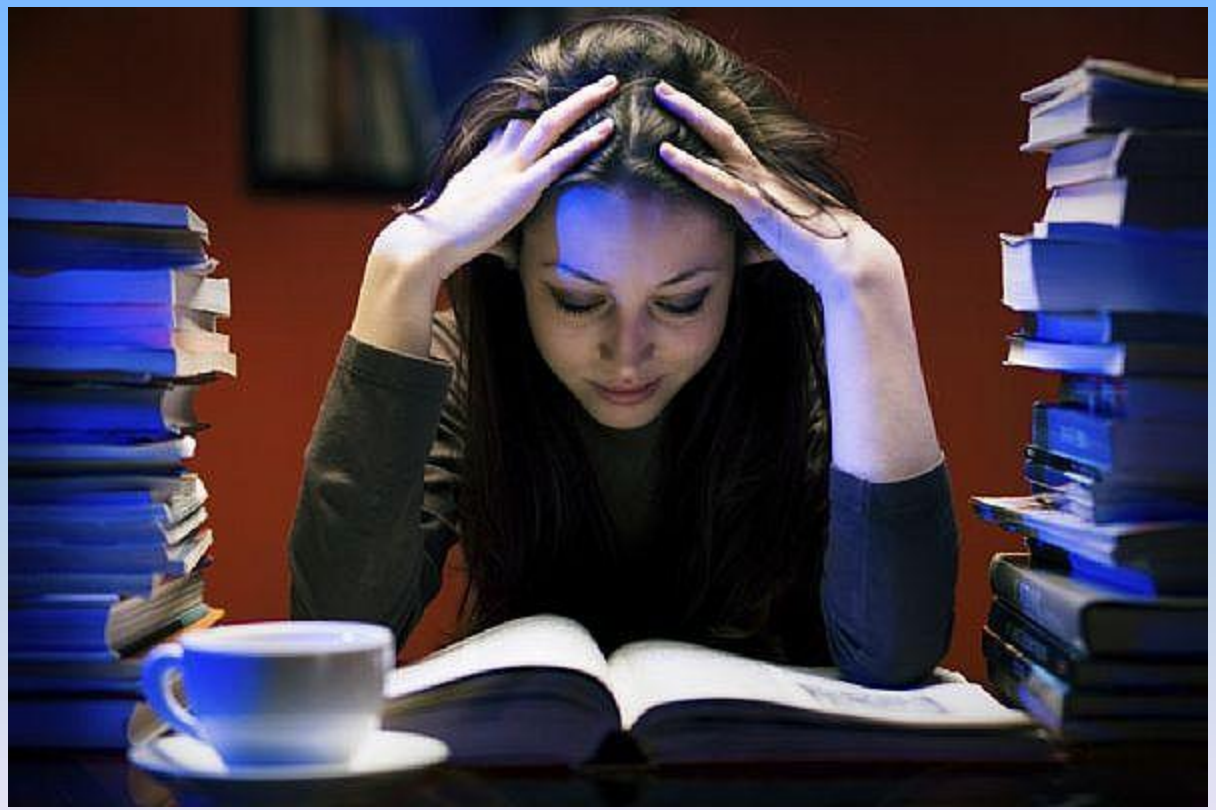
Agenda

- The New Hollywood Workflow
- Hollywood Exabyte Mathematics
- Some Observations from the Trenches
- Industry Challenges

Disclaimers

This is a business talk, and not a scientific paper

With apologies, these are new problems with few solutions

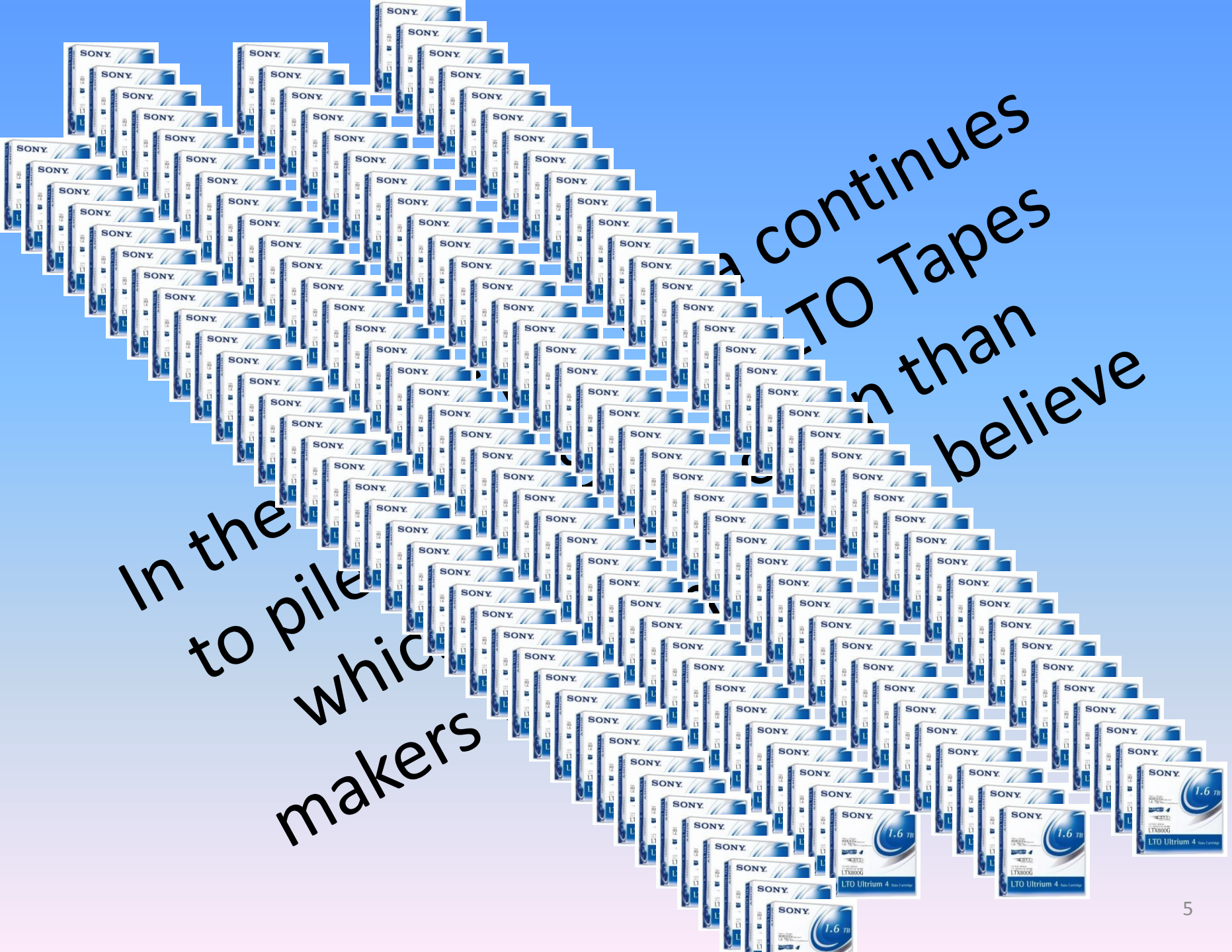


“Take-aways”:

Hollywood is going digital. Film as a medium is declining.

As a result, Exabyte-scale crisis has been created.

Cost-effective answers are few and far between.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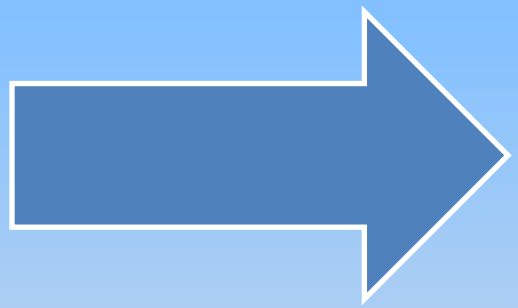
The New Hollywood Workflow

Start with film or data from the set…

If Film, Make It Data



Organize and Store Data

Make Every Single Frame Look Better

Store It Again (new version)

Prepare It For Theaters: Digital and Film

Show It

Archive it!

Hollywood Exabyte Mathematics

Average movie is 110 minutes:

That’s 6600 seconds…

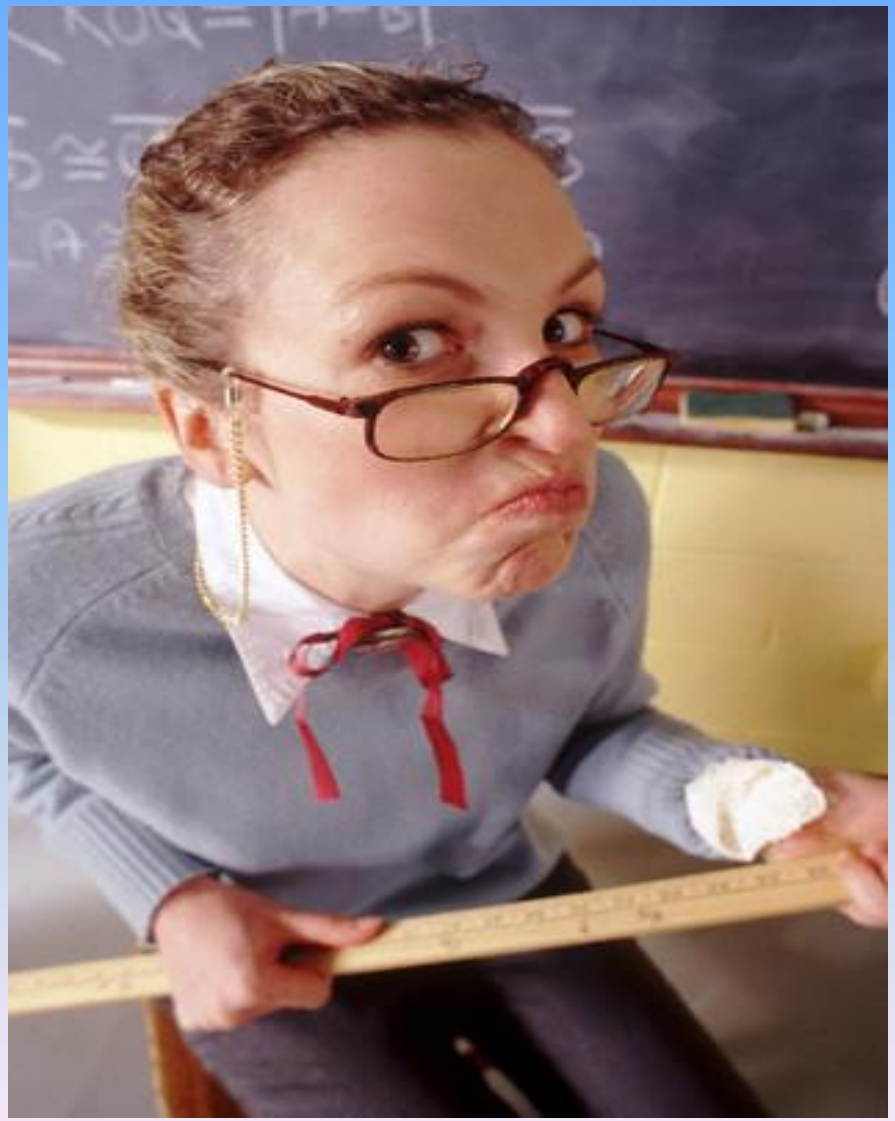
There are 24 frames per second…

Which equals 158,400 frames per movie…

Each frame occupies 12.7 MB’s:

So, there are 2,011,680 MB’s per movie.

Are you with me?



There are 200 “A/B List” Movies a year

With approximately 25 versions of each movie

Which totals 10,058,400,000 MB’s

Now we're in EB Territory

But, "there's more!"

We haven't even included:

Back-ups (3 copies minimum)
Dailies / Out-takes (factor of 2 – 12)
3D (factor of 2)
4K (factor of 4)
Video Versions for Home TV

Archiving - The Good Old Days

Store the cut original negative in a Vault or Salt mine.

Archiving Today

? ? ?

Own any LTO stocks?

Some Observations…
From the Trenches

Observation 1

- Digital is here now.
- Avatar was the first movie released with more digital copies than film copies

Observation 2 - Real World Horror Stories Abound

A major studio discards the digital archive, and then needs to make changes for the DVD version

A software flaw causes a robot to access a single tape 1000's of times in a day, destroying it in the process

A major studio pulls tapes out of its archive, only to find they are unusable; the movie is "lost"

An assistant grabs a tape with important image data and puts it in the tape robot , where it is over-written

Observation 3
Storing images is useless if you can't find them

- Metadata solutions are needed

Observation 4 – Costs are still WAY too high

- $500 - $15,000: Cost per TB
- Exascale storage is not cost-justified…but it is sorely needed.

Observation 5 – Back-up Systems Are Not as Reliable as You Think…

There are MANY reasons tapes and drives fail early and lose data:

- Software, human, physical, hardware

Industry Challenges

- Take a quantum leap in storage technology in order to:
  - Dramatically reduce costs
  - Increase software reliability
  - Deal with the back-up conundrum and related costs
  - Automate metadata creation: How do I find it once I store it?

In conclusion:

Hollywood is going digital. Film as a medium is declining.

As a result, Exabyte-scale crisis has been created.

Cost-effective answers are few and far between.

We look forward to solving these new problems with you.

Recommended Reading

Thanks for Listening!

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