

# Going Asynchronous In Live Production Compute

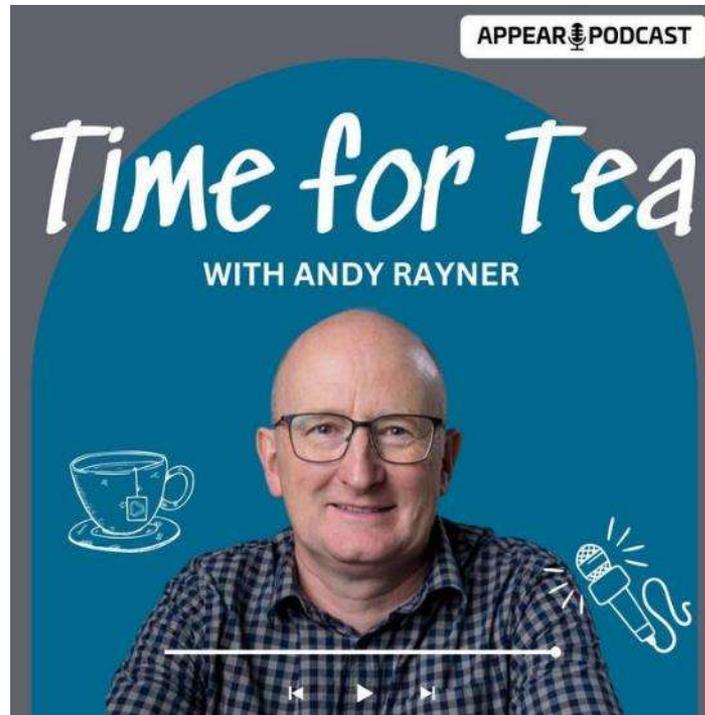
*Andy Rayner, CTO, Appear*

*andy.rayner@appear.net +44 7711 196609*





*2 year anniversary  
today!*



**appear**

**VSF**



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“The elaborateness of the equipment required by the very nature of the undertaking precludes any possibility of television being available in homes and offices generally.”

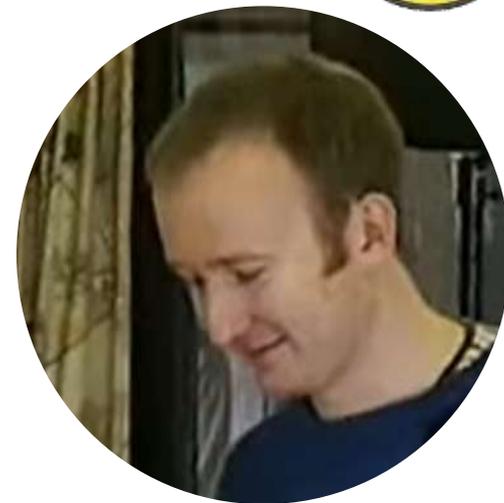
– W. S. Gilford, president of AT&T, April 7, 1927





“IP will never be used for professional television production connectivity.”

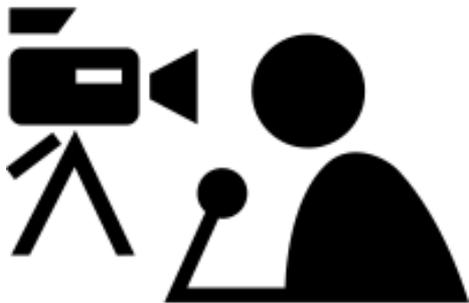
– Andy Rayner, Broadcast Technology Group,  
BT, September, 1996



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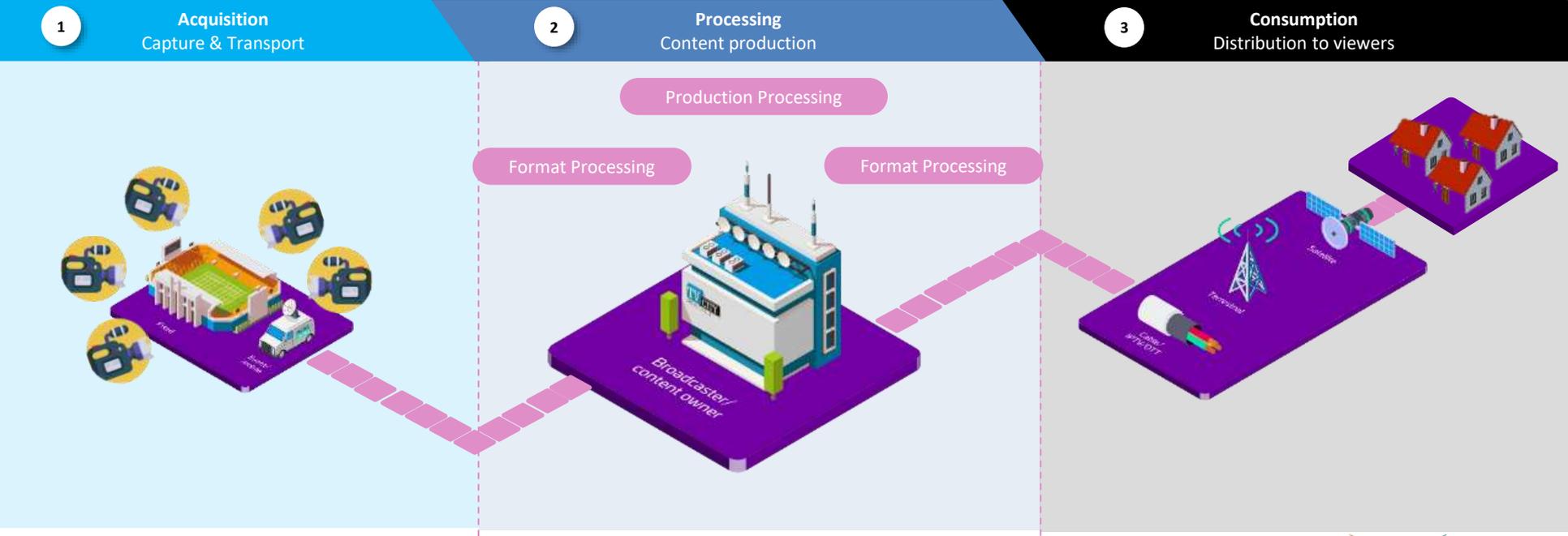
# 100 years of Television!



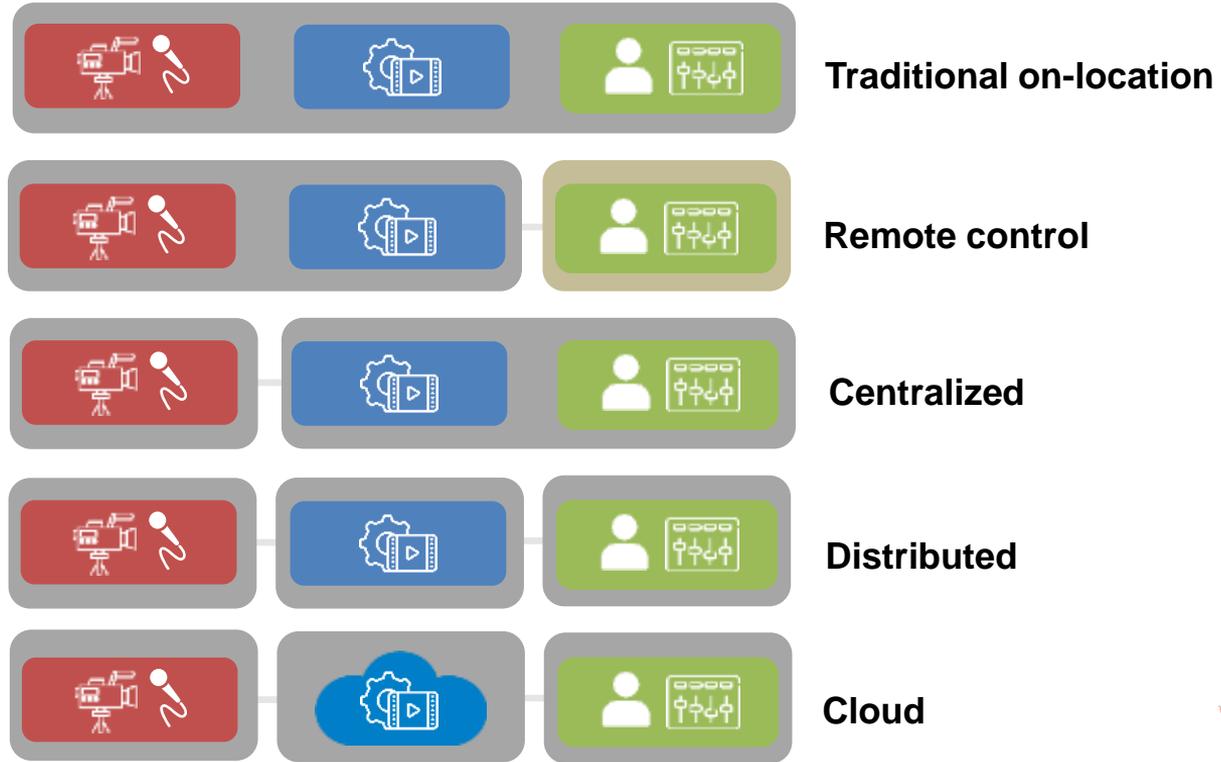
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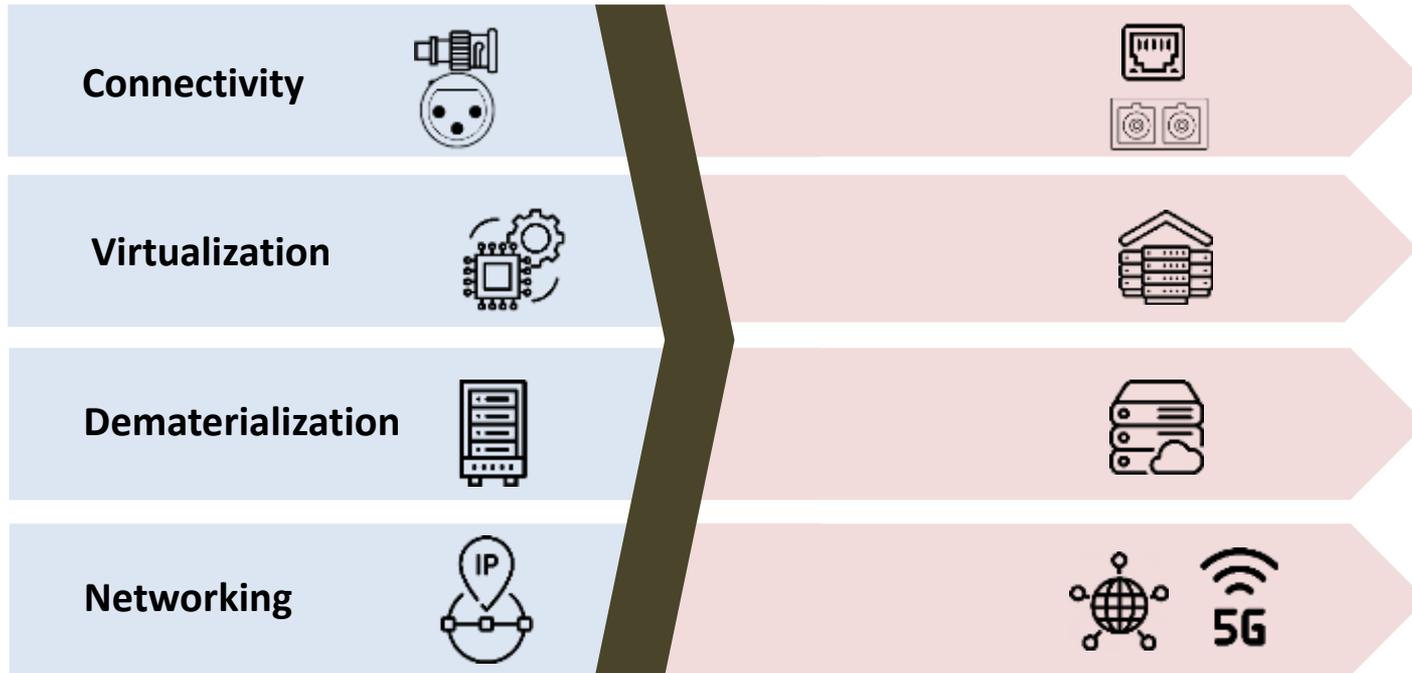
# The Live Production Workflow



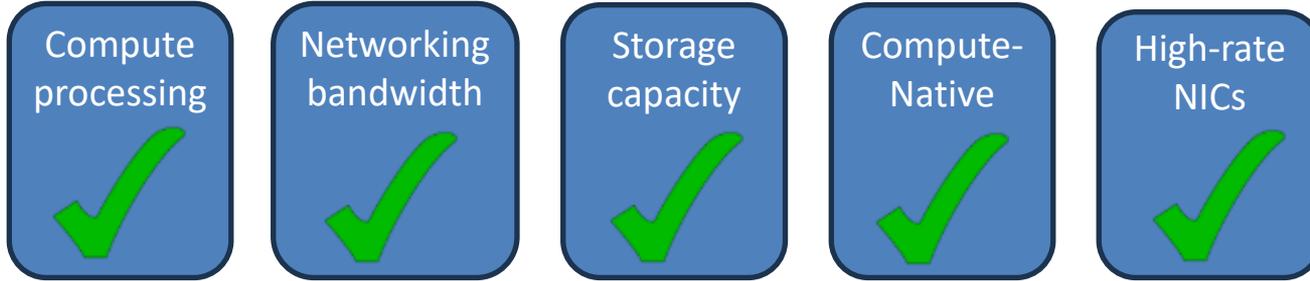
# Location-agnostic live production



# From the bespoke to the generic



# Compute is now ready for live production! ....and it is the future!



7 x 2160p50 422 @ 16bit  
4 x 2160p50 4224 @16bit with alpha/key channel  
28 x 1080p50 @ 16 bit  
18 x 1080p50 @16 bit with full alpha/key channel

**100Gbps**

# Non-linear native compute interconnect future

VSF GCCG

2025 EBU MXL



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What do we mean by  
Synchronous/linear → Asynchronous/non-linear/bursty



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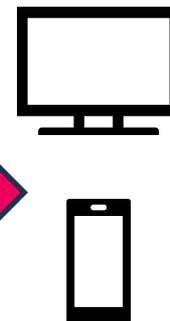
Acquire

Contribute

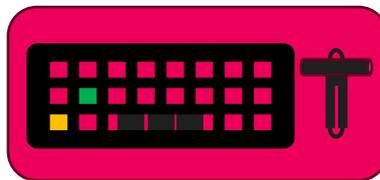
Process

Deliver

Consume



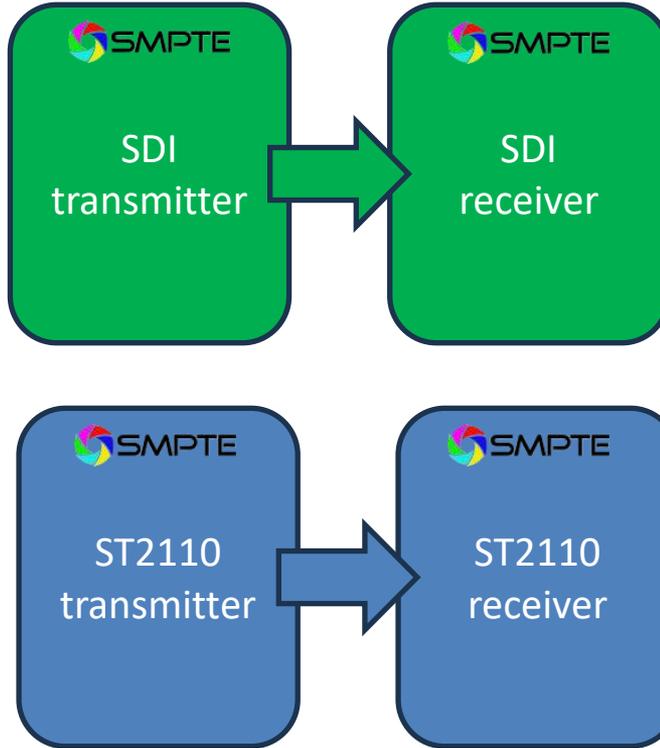
Control



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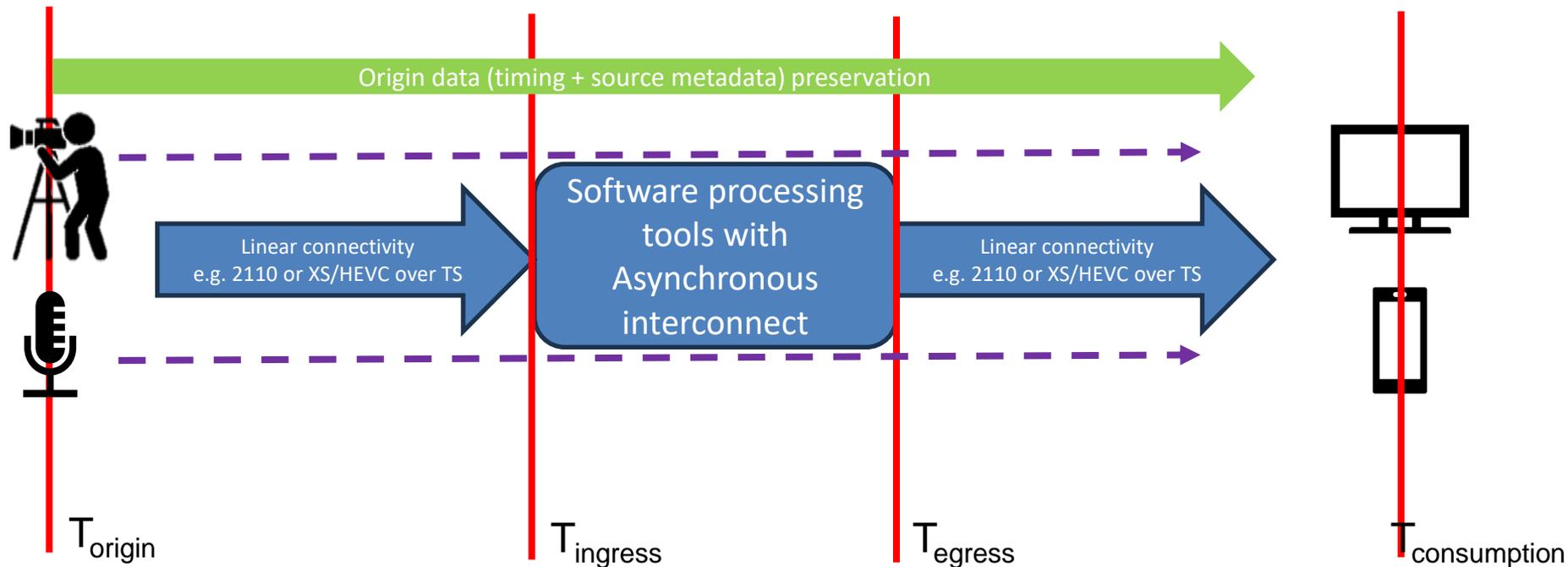


Previous focus purely on the interface – SDI, ST 2110



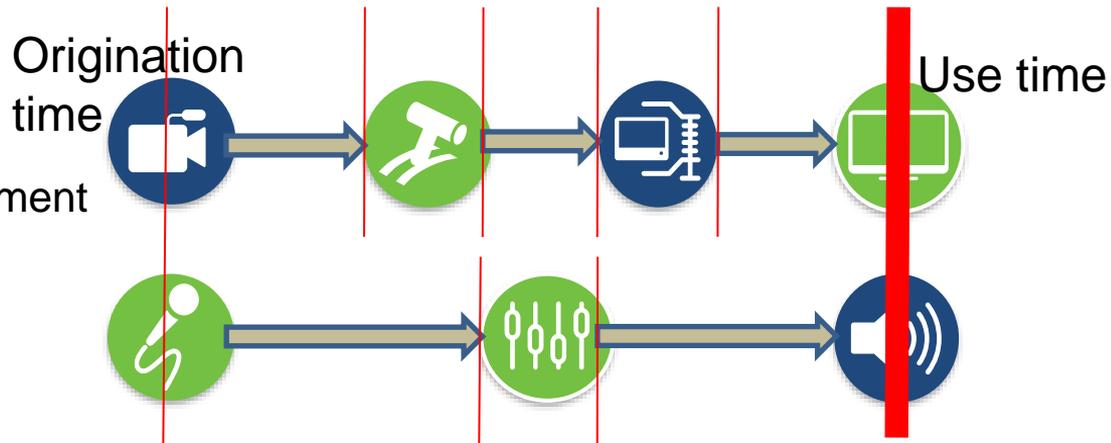
*But our TRs were better!*

# The hybrid linear/non-linear production chain

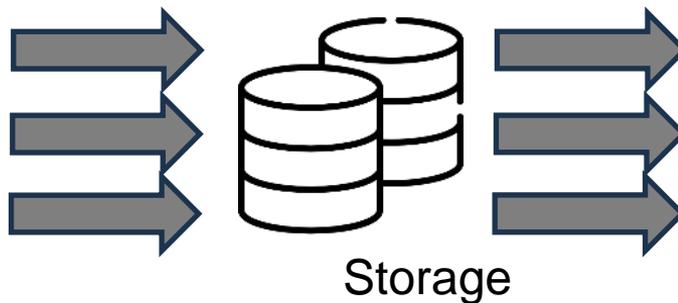


# Use cases for source timing & metadata propagation through hybrid

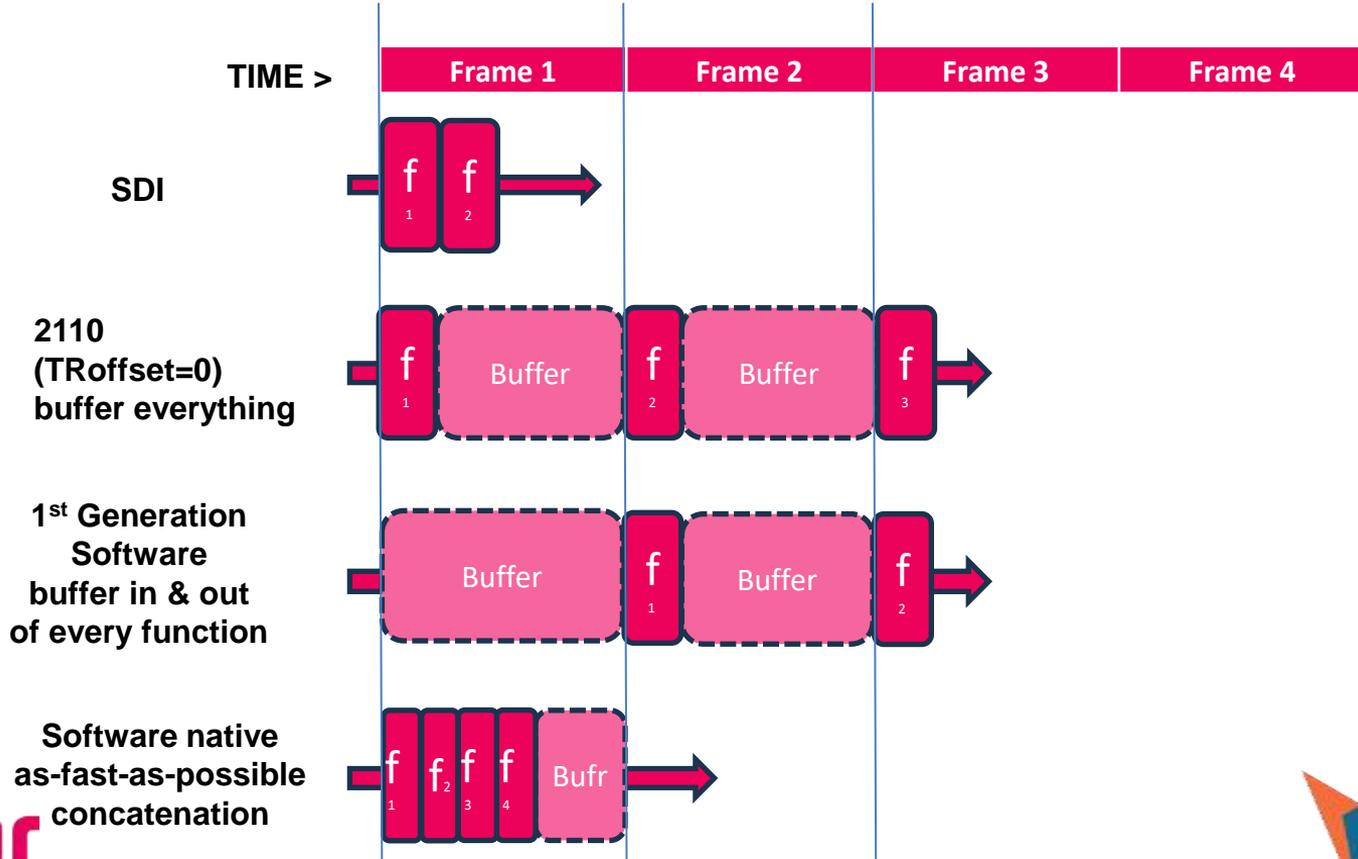
Downstream automatic essence alignment  
(V-V, A-A, A-V, V-M etc)  
(See initial ST 2110-11 work)



Synchronised ISO replay  
(V-V, A-A, A-V, V-M etc)

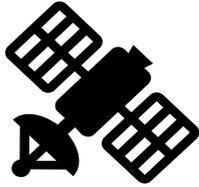


# Interface latency comparison

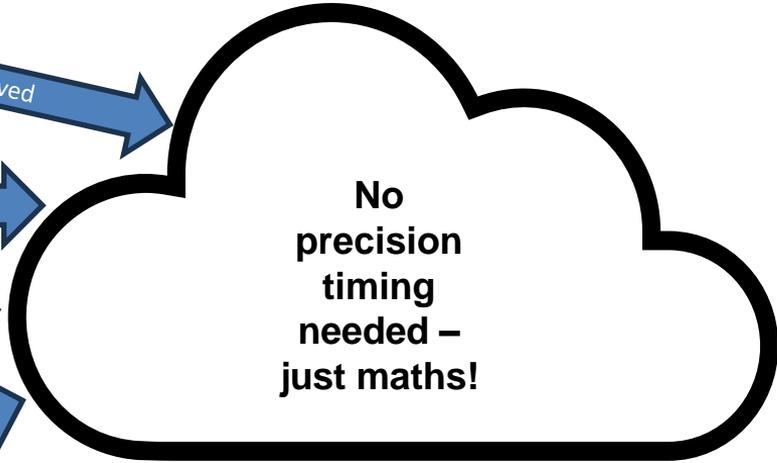




(GNSS-based)  
Precision  
Acquisition  
Timestamp



# Busting myths – precision time requirement



No  
precision  
timing  
needed –  
just maths!

# Converging industry initiatives



DMA (local) &  
RDMA (remote!)

Uncompressed &  
compressed

Single essence  
based (groupable)

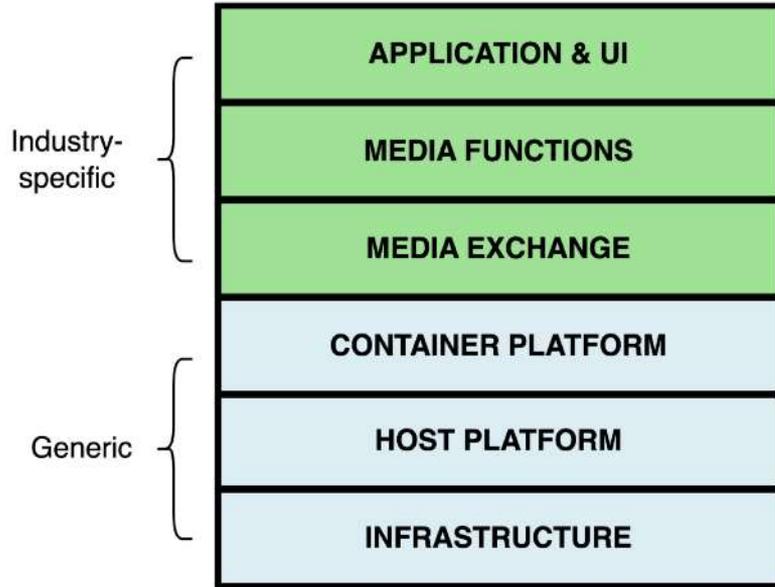
16 bit planar video

32 bit float audio

-40 & -41 'ANC'

JT-DMF  
Sept. 25

# EBU Dynamic Media Facility



**EBU**

OPERATING EUROVISION AND EURORADIO

**THE DYNAMIC MEDIA FACILITY:  
REFERENCE ARCHITECTURE  
WHITE PAPER**

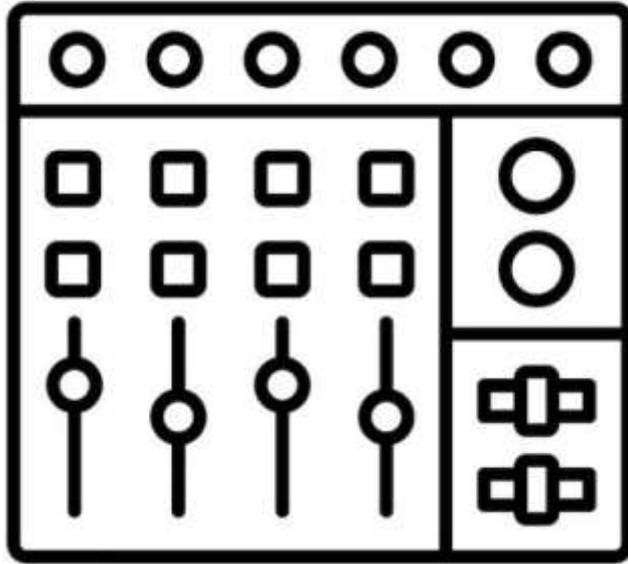


SEPTEMBER 2024

**appear**



Audio *has* to be included in asynchronous transfer



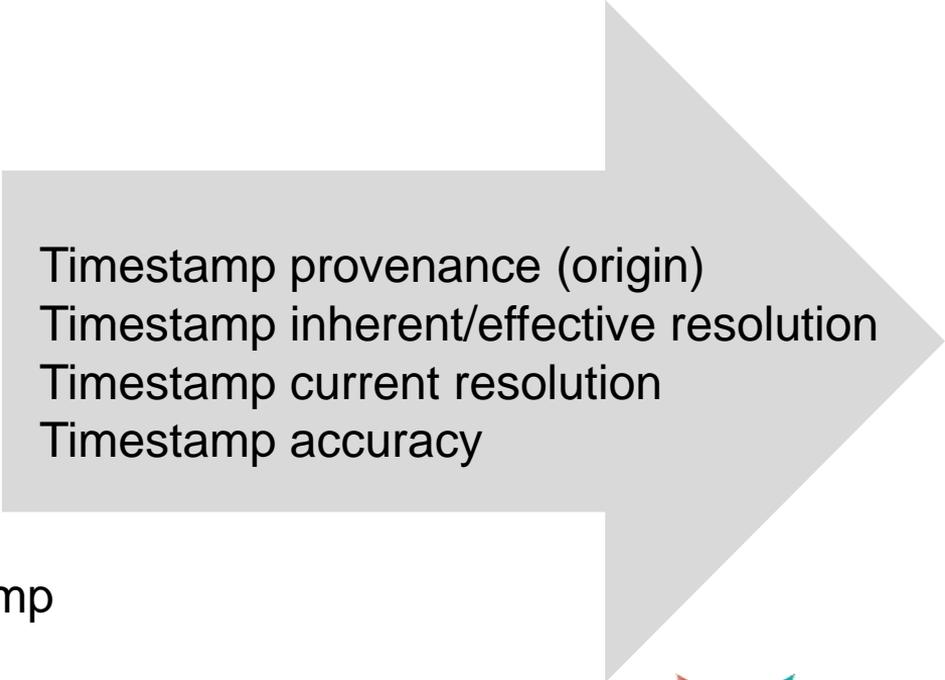
# Origination Metadata and other info



- Camera location data
- Camera positioning data
- Camera acquisition data
- Camera capture timestamp

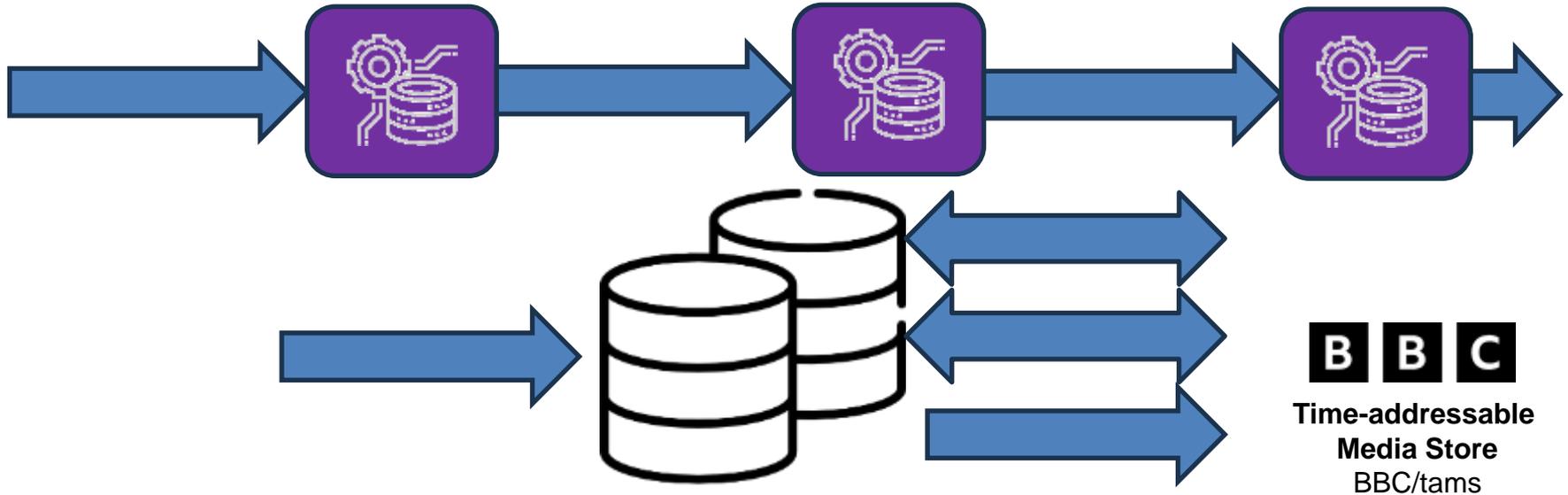


- Microphone location data
- Microphone capture timestamp

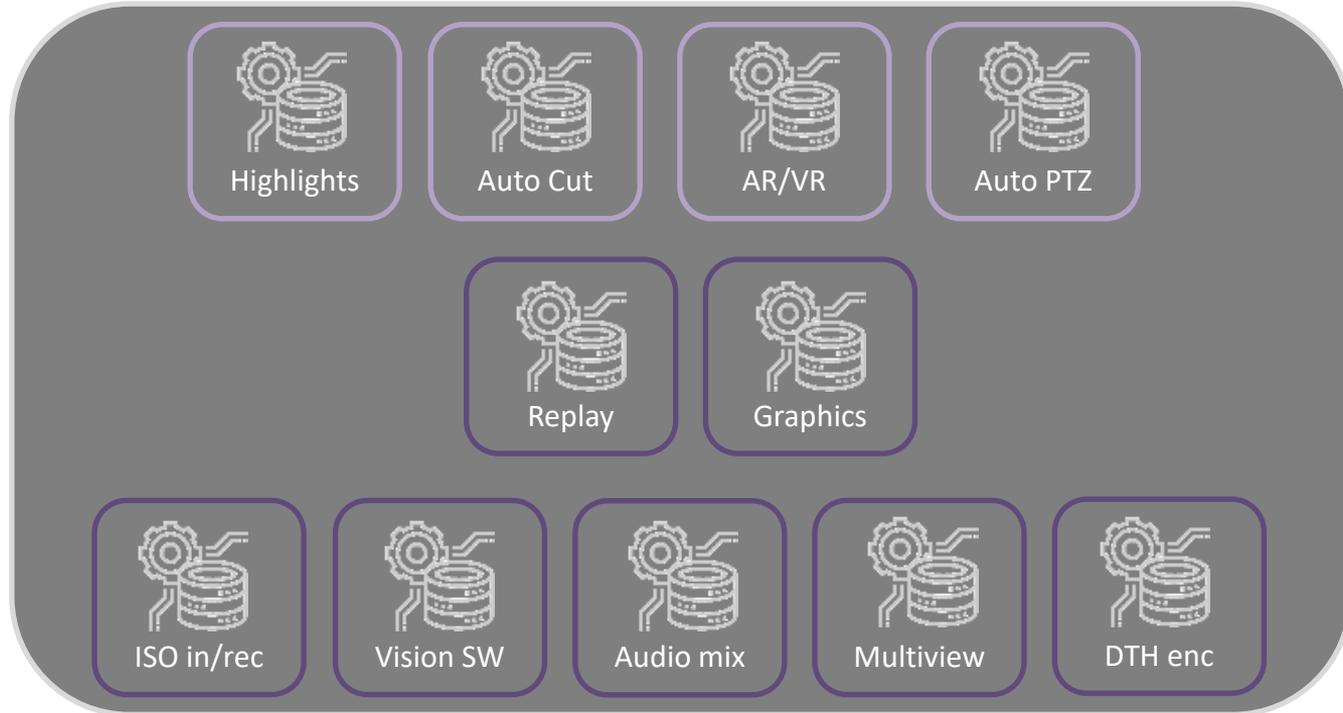


- Timestamp provenance (origin)
- Timestamp inherent/effective resolution
- Timestamp current resolution
- Timestamp accuracy

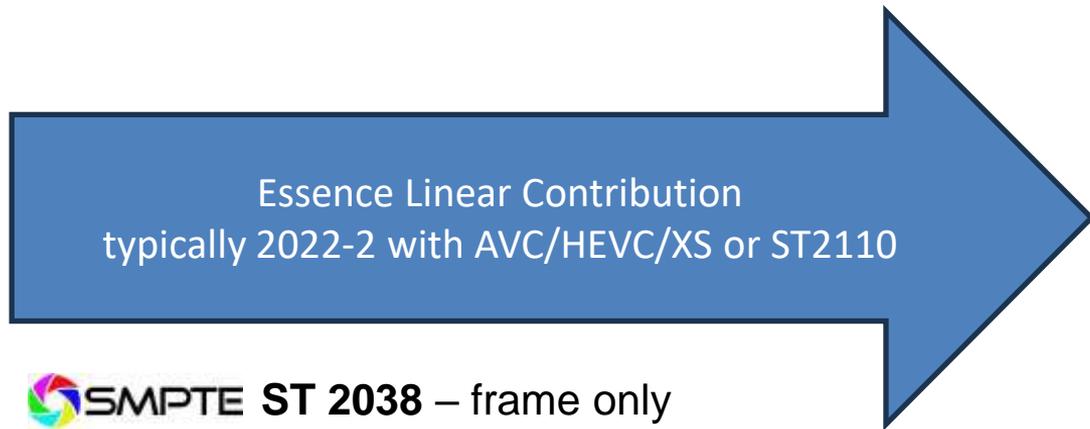
# Converging hybrid world: Signal-centric <-> storage centric



# Live – near-live convergence



# More work needed on linear contribution (Ground-Cloud)



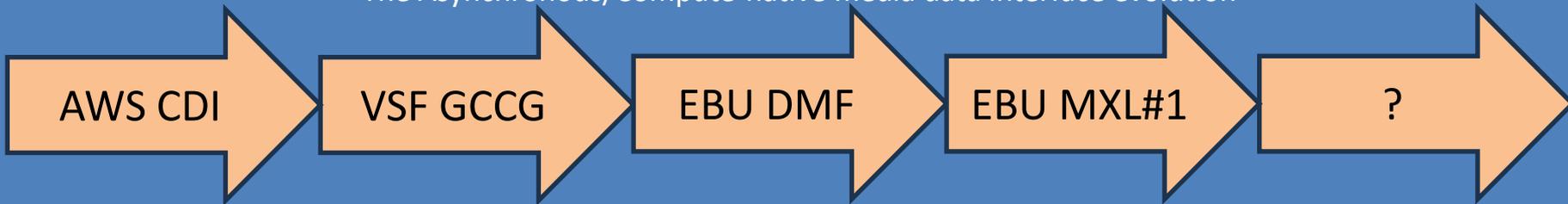
*? Future TR ?  
? The bit we  
missed in GCCG?*

## **TEMI (ITU H.222 Annex U) – capable of 64 bit timestamp (PTP)**

“This annex specifies a format for carriage of timeline and location of external media resource that may be used as a synchronized enhancement of an MPEG-2 transport stream”

# So where are we at today (October 2025)?

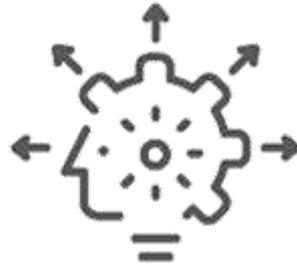
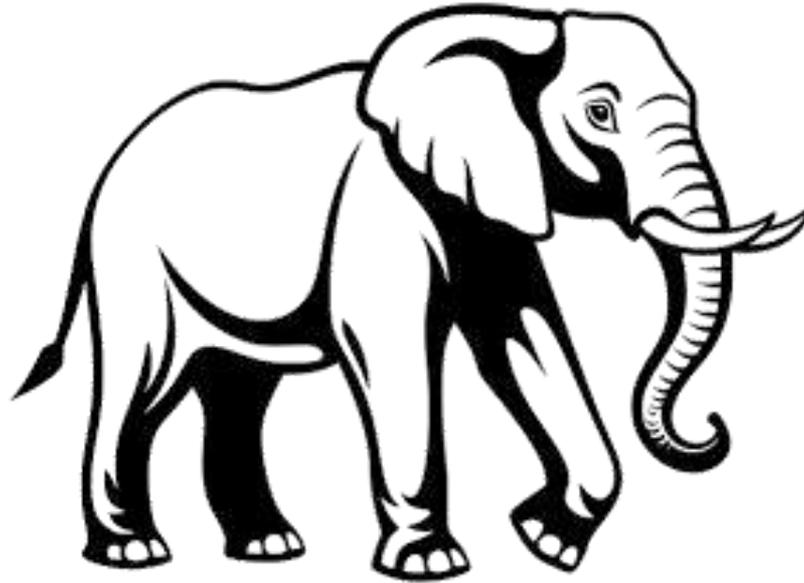
The Asynchronous/Compute-native media data interface evolution



System-level thinking



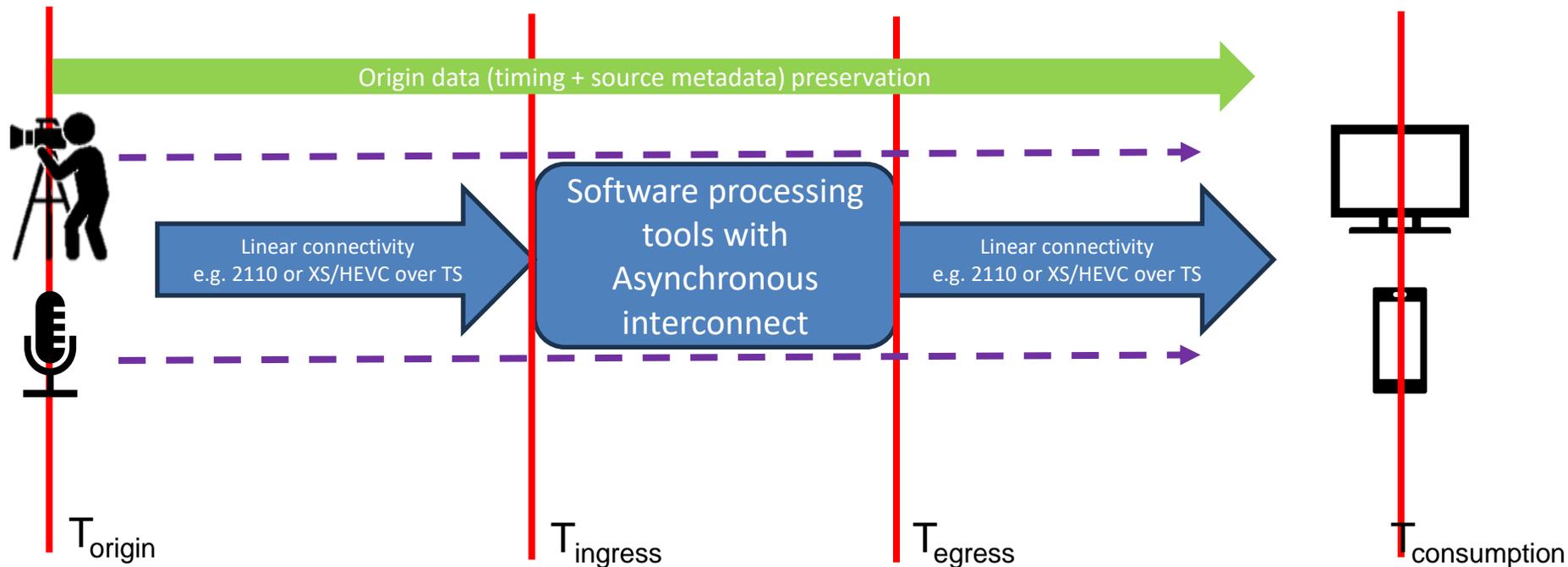
The other elephant in the room.....



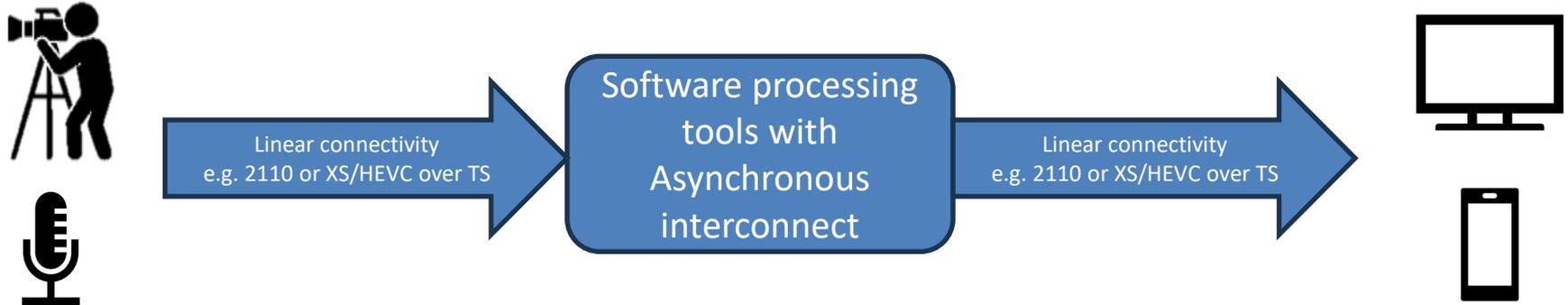
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# The hybrid linear/non-linear production chain



# Actions to be taken



- End2End thinking with hybrid connectivity
- Engage with industry initiatives
- Help fill the gaps
- Stay converged

“Any man can make mistakes, but only wise men learn from their mistakes.”

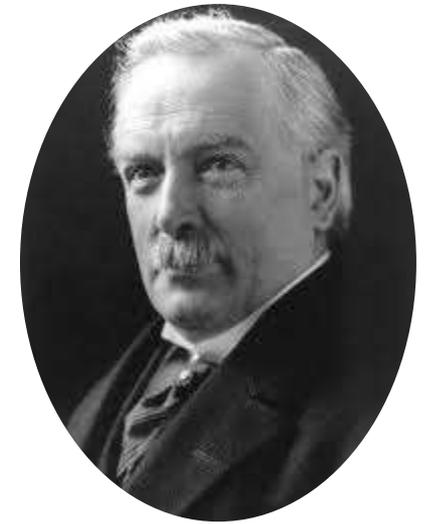
Winston Churchill 1948

\*(possible misattribution!)



“Television ? The British public won’t want it.  
There will be no demand for it”.

David Lloyd George 1938



Thank you!



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