



# Live & Linear Broadcast in the Cloud

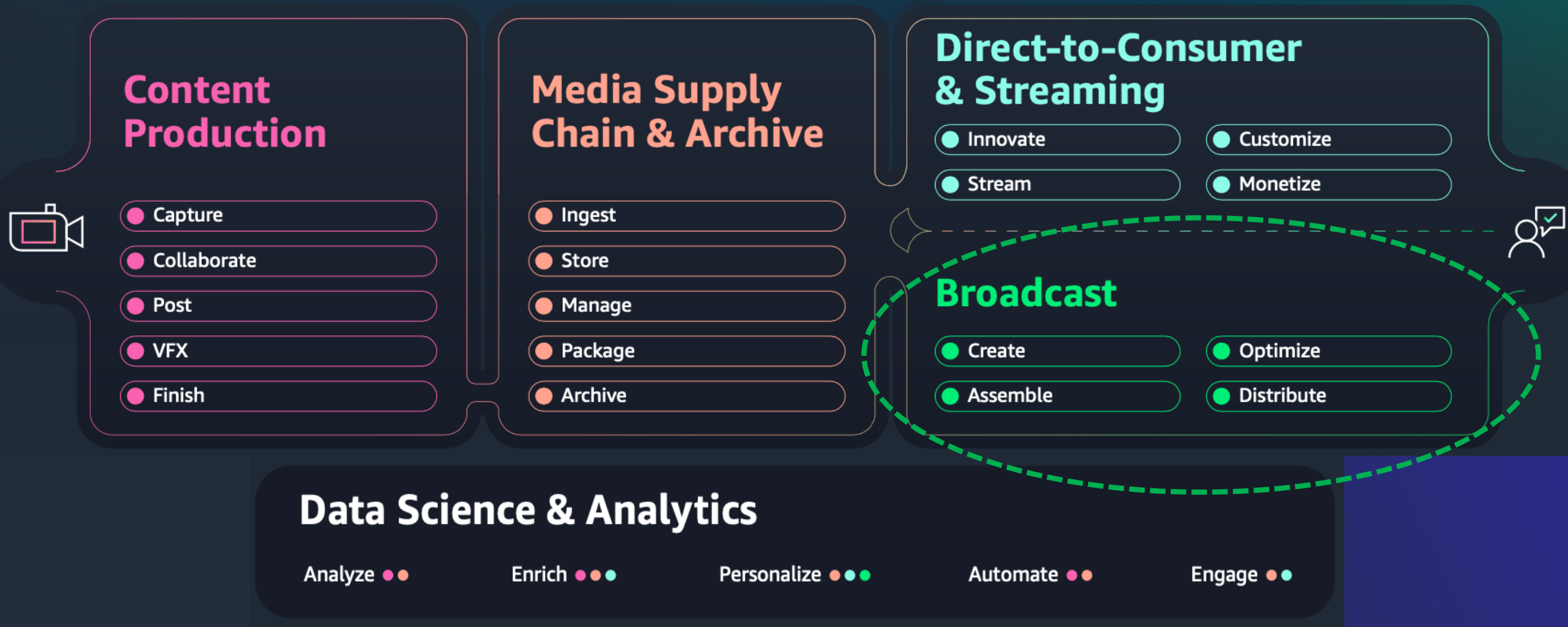
*Dutch Guild, September 2022*

**Michael Armstrong**, *[miketja@amazon.com](mailto:miketja@amazon.com)*

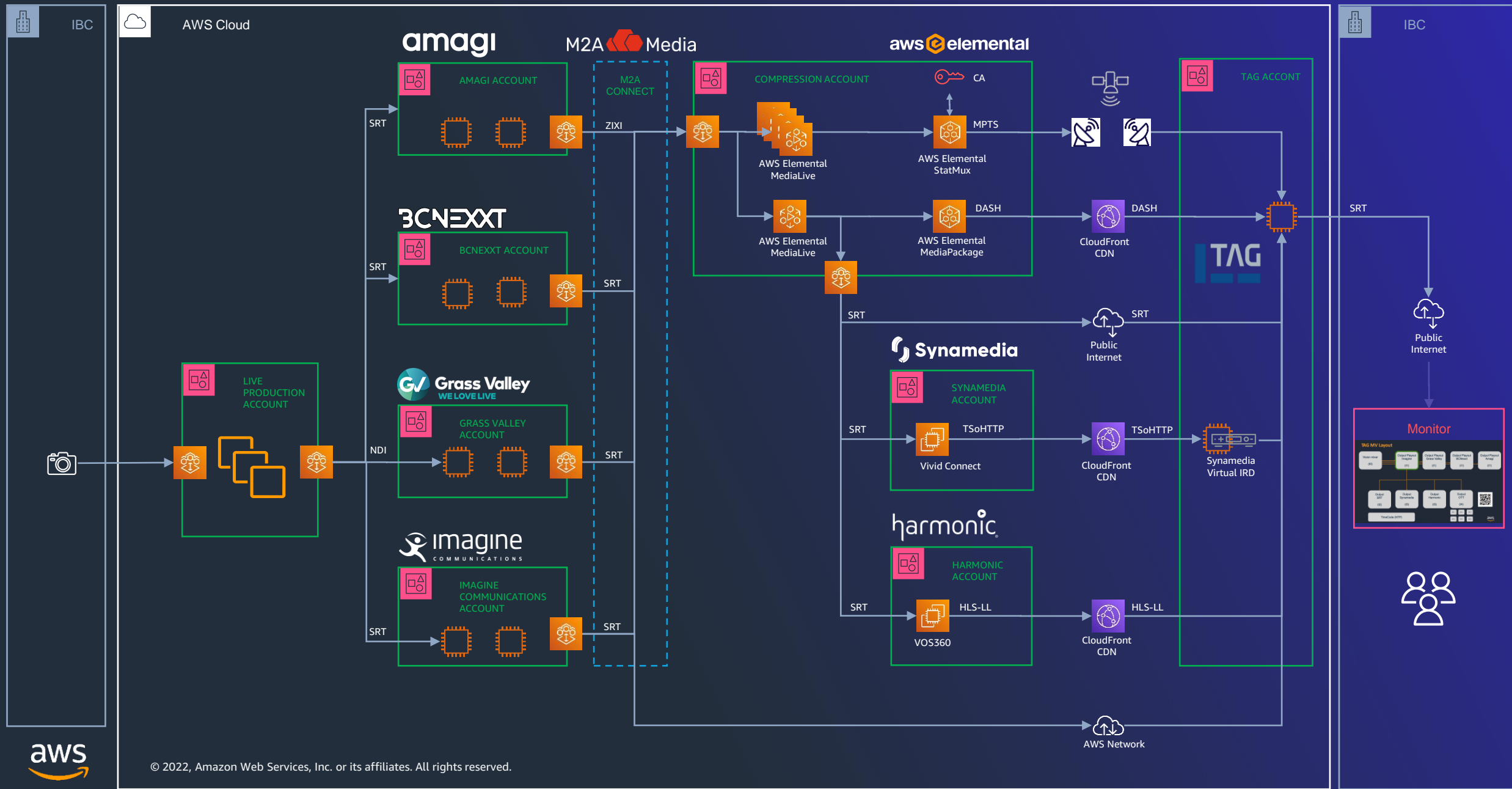
Principal Business Development Lead, EMEA  
AWS – Media & Entertainment

# AWS FOR MEDIA & ENTERTAINMENT

## From camera to consumer



# IBC 2022: Broadcast Payout and Next-Gen Distribution

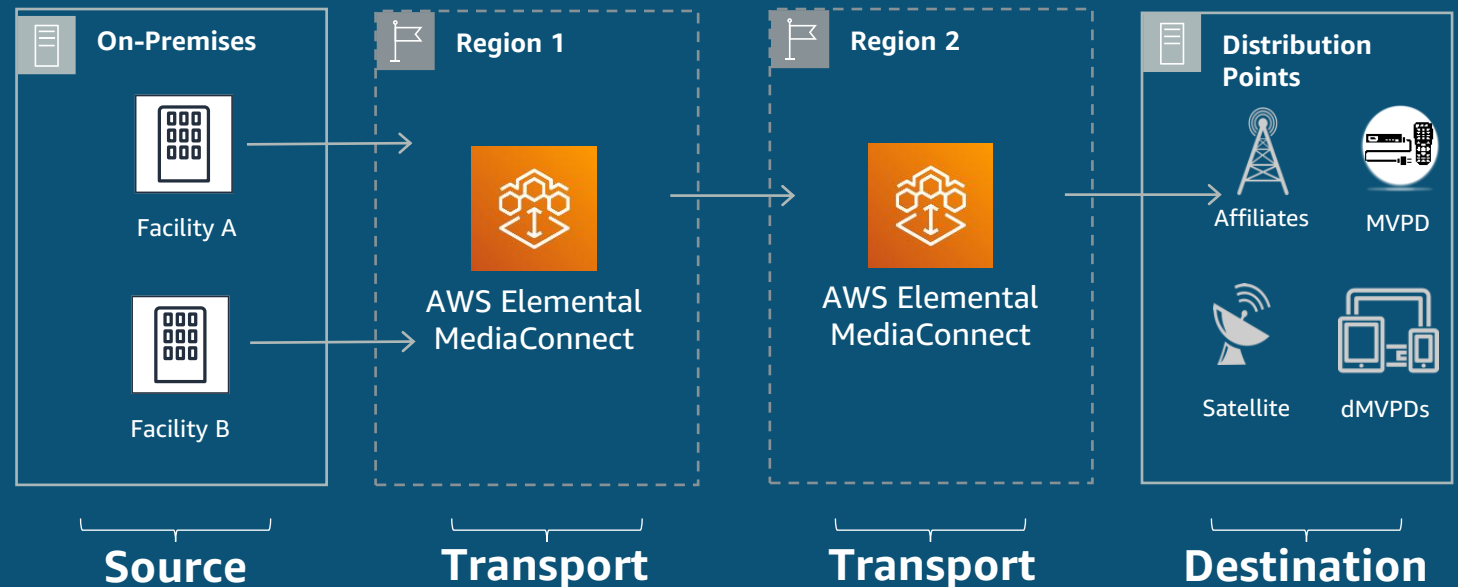


# Point to point cloud distribution – MediaConnect

## Secure, reliable live video transport

### MPEG-2 transport stream

- Standards based:
  - SRT, RIST, Zixi, RTP/FEC
- Input source failover support (2022-7)
- SPTS and MPTS support



# MediaConnect Enhancements

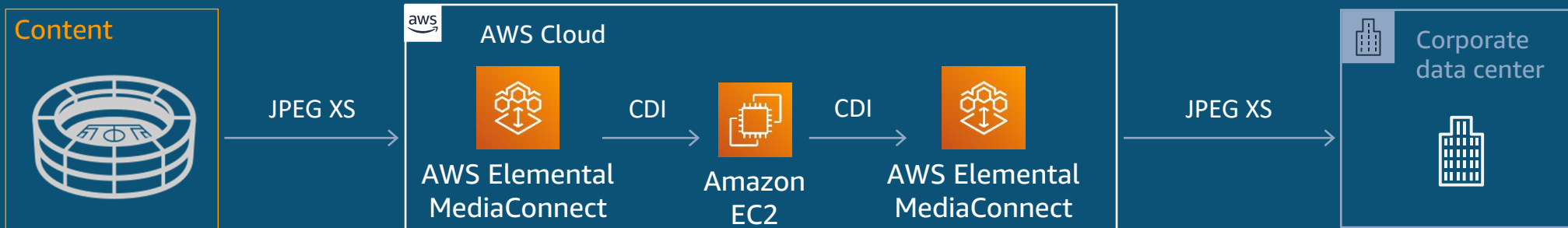
## AWS Cloud Digital Interface (AWS CDI)

- Route video, audio, and metadata streams using AWS CDI to provide uncompressed, low-latency video to AWS CDI-enabled applications
- Can move 4K 60fps live video between EC2 instances with less than one frame of latency



## JPEG XS Support

- Encode and decode support
- Perceptually lossless compression, low latency (~ 3-5 frames)
- SMPTE 2110-22 JPEG XS Protocol



# Live Production – ATP Media



- **ATP POC<sup>1</sup>:** Paris Rolex Masters ATP 1000, 4 days, 8 hours live production/day
- Focus on live production workflows including Live video and audio mixing; Slow motion replay; Scoring and other data driven graphics; Monitoring and multiviewer generation for the remote users; NLE Editing (fast turnaround) & MAM
- 12 Cameras; Hawkeye ball-tracking solution; Multiple audio feeds; Intercom; Data-feeds for live GFX; smartphone contribution; remote commentary
- Testing with multiple partners: Grass Valley; Vizrt; Simplylive; Sienna; Deltatre; Grabyo; MAVIS.

1: <https://www.svgeurope.org/blog/headlines/atp-media-aws-and-gravity-media-complete-virtualised-live-production-proof-of-concept-at-the-paris-masters/>

# Live Production – PGA Tour



- US PGA<sup>2</sup>: The Players Championship, Sawgrass, 2022
- Worked with Hawkeye, NEP, Trackman
- In 2021: Hawkeye/Trackman on-site, producing feeds/graphics on-site, sending to AWS for US domestic and international distribution
- In 2022: 80+ camera feeds directly into AWS, used AWS instances for Hawkeye and Trackman, graphics as HTML5 overlays, remote teams connected into AWS, not to Sawgrass.
- Saves time and enables more pre-prep: build/test in AWS before the event, on-site prep limited to contribution encoders into cloud
- Production in the cloud offers potential for new features/services from cloud-enabled partners

2: <https://www.sportsvideo.org/2022/03/11/the-players-championship-pga-tour-entertainment-live-production-takes-major-leap-to-the-cloud/>

# Value realization: Linear Playout



## Profile

**220**  
**Countries**

**1,000**  
**EC2 instances**

**15**  
**Petabytes content**

**2016**  
**Migration to AWS**

## The Benefits



### Cost savings (TCO)

- 61% reduction in Infrastructure Total Cost of Ownership (TCO)
- 92% decrease in on-premises server footprint (130 to 10)
- Avoided new facility leases in London, UK



### Staff productivity

- 13x improvement in staff productivity
- 40-60 channels monitored by an individual vs. 3 channels on-premises
- 30% increase in engineers' time focusing on innovation



### Operational resilience

- 99.999% uptime today vs. 99.9% on-premises
- Multi-region model of redundancy
- No disruption to customer experience while upgrades and maintenance were deployed automatically



### Business agility

- 50% faster time to market for new service launch
- 5 months to integrate Scripps Networks Interactive after acquisition deal closed
- Seamlessly stood up a parallel configuration and switched over from UK to Amsterdam following Brexit

<https://aws.amazon.com/solutions/case-studies/Discovery-case-study/>



# A+E Networks UK moves broadcast operations to AWS



A+E Networks® UK has transitioned its playout and service delivery for its entire bouquet of 30 channels in Europe to AWS Cloud.

A+E Networks® UK is a leading media network reaching 58 million homes across 100 countries.

## Problem

Initially set up as a business continuity playout option, the operation was transitioned to be the primary facility in a matter of weeks.

Over 50,000 hours of content was ingested on to the cloud, and playout and delivery

## Use of Cloud

- Amazon S3 for storing content, graphics, and metadata
- AWS Lambda for auto QC, graphics processing
- Amazon RDS and IAM for access
- Amagi CLOUDPORT for channel playout

## Business benefits

- Greater Flexibility and Scalability
- Multiple geographies covered with cost-effective cloud playout
- Manage broadcast operations remotely
- Improved operational insights at all stages of the broadcast workflow

“This partnership is an important milestone in our goal to create an effective, scalable, and future-facing operations in the cloud that is well positioned in our supply chain”

- Matt Westrup, Vice President of Technology & Operations, A+E Networks® EMEA



# Channel Assembly Case Study: Seven West Media



Started with a short 11-day linear channel of “Big Brother” Season 1 content prior to the start of Season 2.

- Channel accounted for 41% of streaming minutes for live channels
- Increased VOD usage by 95%

Second experiment that ran longer increased VOD consumption of that content by 191% and totaled 25% of all streamed minutes

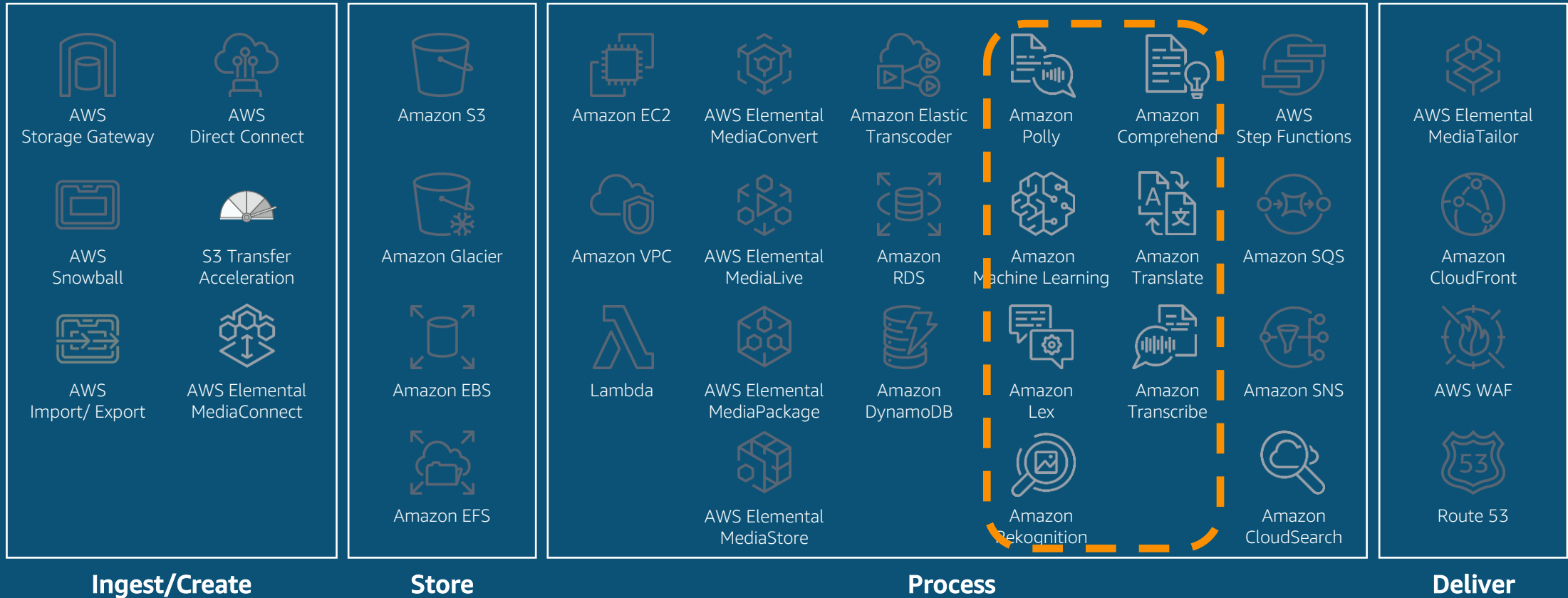
Latest experiment: created a new branded channel with existing content from 4 seasons of a Home/Garden show, now their #1 linear channel

Building more channels focusing on sports or reality TV, as well as new FAST channels

<https://aws.amazon.com/blogs/media/seven-west-media-amplifies-audience-engagement-with-channel-assembly-in-aws-elemental-mediatailor/>

# Build with AWS managed Services

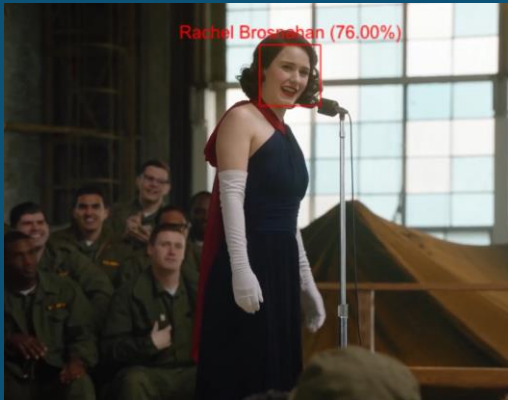
Managed



# Metadata enrichment

## Computer Vision

- Face Detection/Matching
- Object/Scene Detection
- Content Moderation – Visual
- Technical cues



## People

Rachel Brosnahan

## Scene

Military  
Military Uniform  
Army  
Flag  
Soldier  
Crowd  
American Flag

## Language

- Content Text Analysis
- Caption Analysis & Translation
- Content Moderation - Language



## Transcription

"That's a lot of khaki. I just realized it is actually a very flattering color for most skin tones. I know you're relieved. I just want you to know how much I admire you guys. I could never be brave enough to wear the same outfit every day."

## Translation

"Isso é muito cáqui. Acabei de perceber que é realmente uma cor muito lisonjeira para a maioria dos tons de pele. Sei que está aliviado. Só quero que saibam o quanto os admiro. Eu nunca poderia ser corajoso o suficiente para usar a mesma roupa todos os dias."

- Reviews Topic Modelling
- Sentiment Analysis

### Top positive review

[See all 3,016 positive reviews](#)



Rowan

★★★★★ **One of the best shows out there!**  
Reviewed in the United States on August 14, 2018

Brilliant writing, big authentic emotions, gorgeous sets and costumes, great music (What, an XTC song as a closing credits song in Season One? Not period at all, but IT WORKED SO WELL). And the acting is flawless. The strange and hilarious patter between family members does so much to build character development and bring the laughs. The jokes are set up and well-timed, and the soft slow heartbreak is drawn out so we feel her pain as much as she does. I adore the gorgeous long shots with no cuts. A true gem of a show.

I discovered this show shortly after my own marriage failed spectacularly, and  
[Read more](#)

## Key Phrases

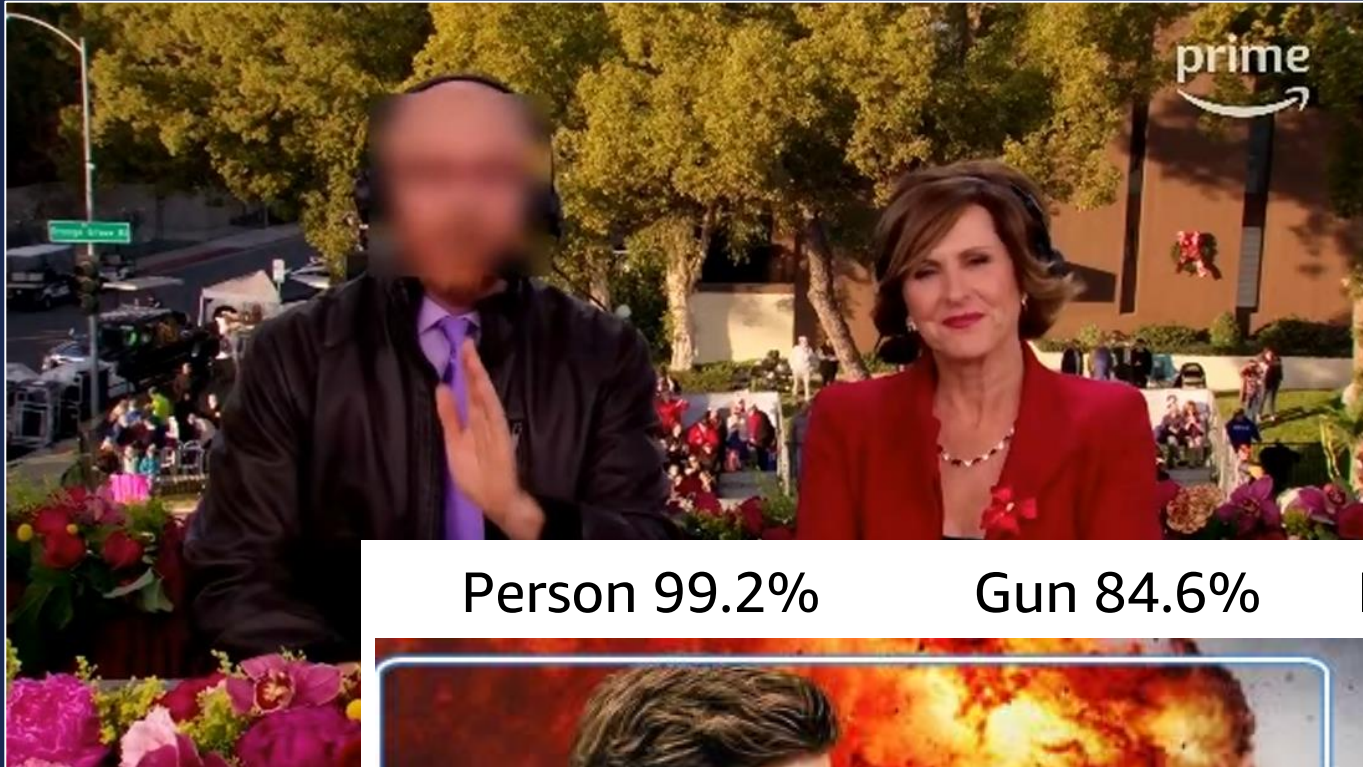
Brilliant writing  
big authentic emotions  
gorgeous sets  
costume  
great music  
an XTC song

## Sentiment

Positive



# Tag, filter, and redact inappropriate content



Person 99.2%

Gun 84.6%

Handgun 73.5%

detect  
weapons



redact  
faces

Drink 96.4% Alcohol 80.1% Wine 69.9%



tag culturally  
sensitive content

# Broadcast vs. IP... the future?

- Lots of trend analysis in different countries in Europe are predicting the end of DTT and the growth of IP for live & linear
- Some are only now deploying DVB-T2, some are switching it off. Some have had to reallocate spectrum (for 5G) some have published their plans to be off DTT by 2030 or so...
- What about DVB-C? DVB-S? IPTV (managed multicast)?
- Impact for public-service broadcasters vs commercial? Fundamental shift in advertising mechanics and resulting revenues/spend?
- New tech? More 4K, HDR, 8K... what else? Metaverse? Anyone remember 3D TV?
- As final distribution to the end-user becomes even more IP-based, originating in the Cloud becomes even more useful for broadcasters, and enables more rapid innovation.



# Thank you!

Learn more about AWS for Media & Entertainment  
at [aws.amazon.com/media](https://aws.amazon.com/media)