



MOVIELABS 2030 VISION

SHOWCASE

Introduction



Mark Turner

Director, Production Technology

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“Time is our Enemy”

John Landau

HPA 2023

We're on our way to...

ProductionLandia



Papers and Blogs



MovieLabs
2030 Vision
Page



THE 10 PRINCIPLES OF THE 2030 VISION

Posted on May 21, 2021
By Mark Turner

A quick overview of the 10 principles of the MovieLabs 2030 Vision. In this video, Mark Turner, MovieLab's Program Director, Production Technology, explains the ten principles of the 2030 Vision, covering: Security & Access; and Software-defined Workflows.



For more MovieLabs videos be sure to subscribe and follow our YouTube channel [here](#).



SECURING CREATIVE WORKFLOWS IN THE CLOUD

Posted on May 19, 2021
By Spencer Stephens

In this video, Spencer Stephens reviews the need for secure, cloud-based content production. This architecture can support media assets and the cloud workflows that produce them.

The video is a good precursor for the paper and is especially relevant for:

- Movie studios, TV networks, broadcasters and OTT streamers
- Production companies
- Cloud service providers and other infrastructure companies
- Application and creative tools creators
- Production service vendors



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SOFTWARE DEFINED WORKFLOWS EXPLAINED

Posted on May 21, 2021
By Jim Helman

Jim Helman discusses the implementation path of the software-defined workflow principles of the 2030 Vision in this video. Jim shares the essential formalisms and specific mechanisms that will enable flexible production workflows with increased automation and interoperability.



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URGENT MEMO TO THE C-SUITE

Investing in Production Technology and Cloud Centricity
is No Longer an Option - It is Table Stakes



Mind the Gap



MovieLabs
2030 Blog

movie
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IS THE CLOUD READY TO SUPPORT MILLIONS OF REMOTE CREATIVE WORKERS?

Posted on December 7, 2020
By Mark Turner

Assessing the readiness of Virtual Desktop Infrastructure (VDI) to support creative users for the 2030 vision

A photograph of a paved road stretching into the distance. The years 2020, 2021, 2022, 2023, and 2024 are painted in large white numbers on the road surface. The road leads towards a range of mountains under a blue sky with scattered clouds.

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CLOUD. WORK. FLOWS

Posted on July 20, 2021
By Mark Turner

Examining cloud ingest, publication and subscription-enabled workflows and the gaps preventing us from reaching the 2030 Vision.

A digital illustration of a cloud. The cloud is shaped like a traditional fluffy cloud but is composed of glowing blue circuitry and data lines. It sits on a base of flowing blue data streams against a dark background with orange and red bokeh light effects.

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THE 2030 VISION IS READY FOR THE CLOUD. IS THE CLOUD READY FOR THE 2030 VISION?

Posted on November 20, 2020
By Mark Turner

The MovieLabs Approach to Cloud Readiness Assessment

A photograph of a clear blue sky with a few white clouds. The word "Vision" is written in large, white, fluffy cloud-like letters across the center of the image.

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DISTRIBUTING WORKFLOWS THROUGH THE CLOUDS

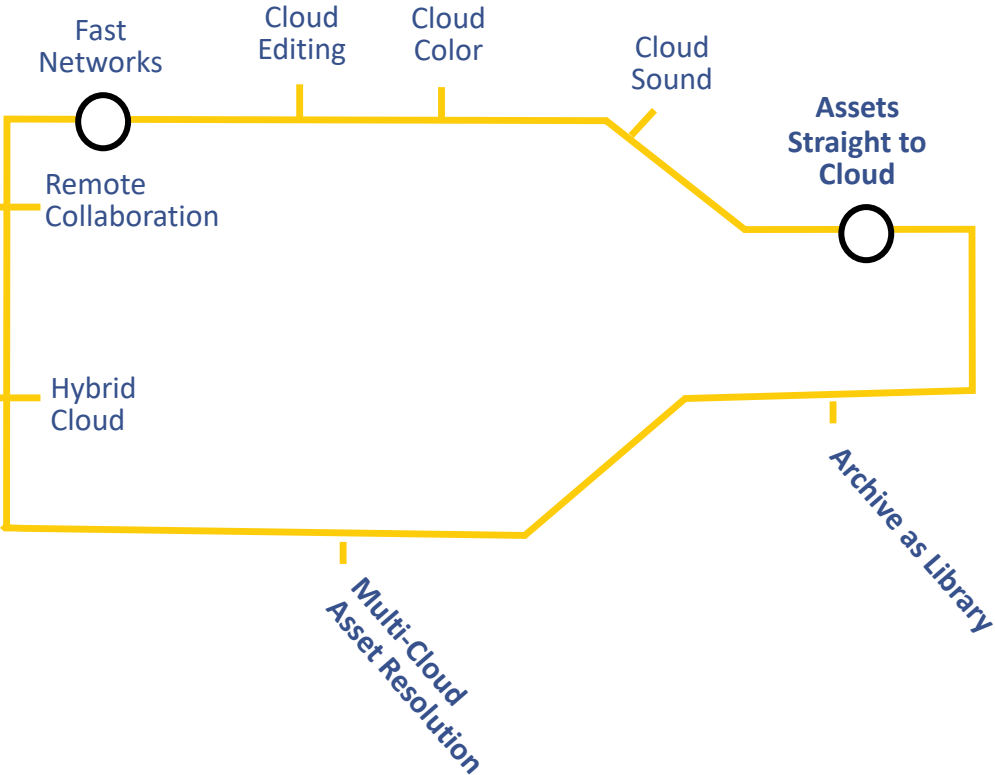
Posted on December 15, 2020
By Mark Turner

The need for interoperable platform architectures to make work flow.

A photograph of a dark asphalt road with a white dashed arrow painted on it, pointing straight ahead. In the distance, a large, single white cloud floats in a clear blue sky above the horizon.

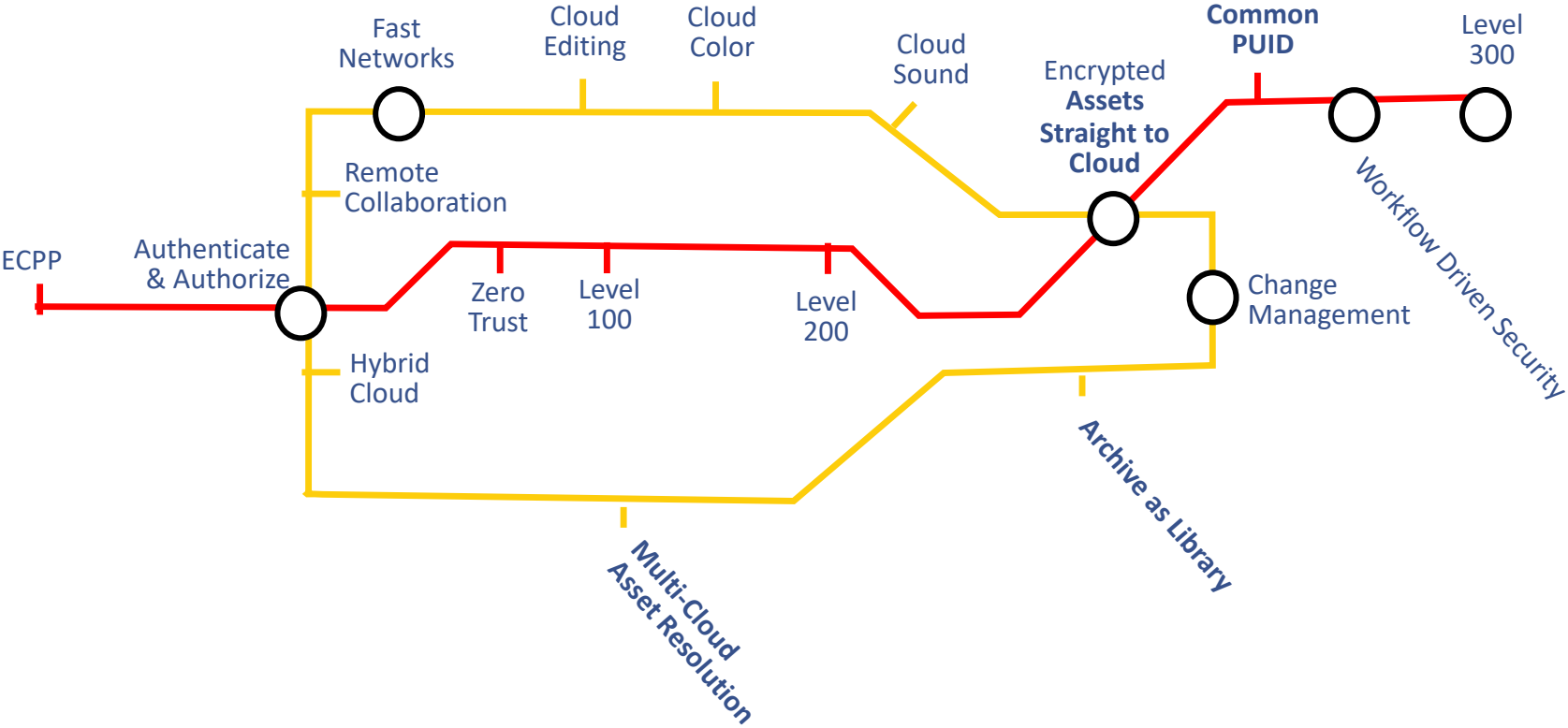
Mind the Gap

— The Circle of Cloud Foundations



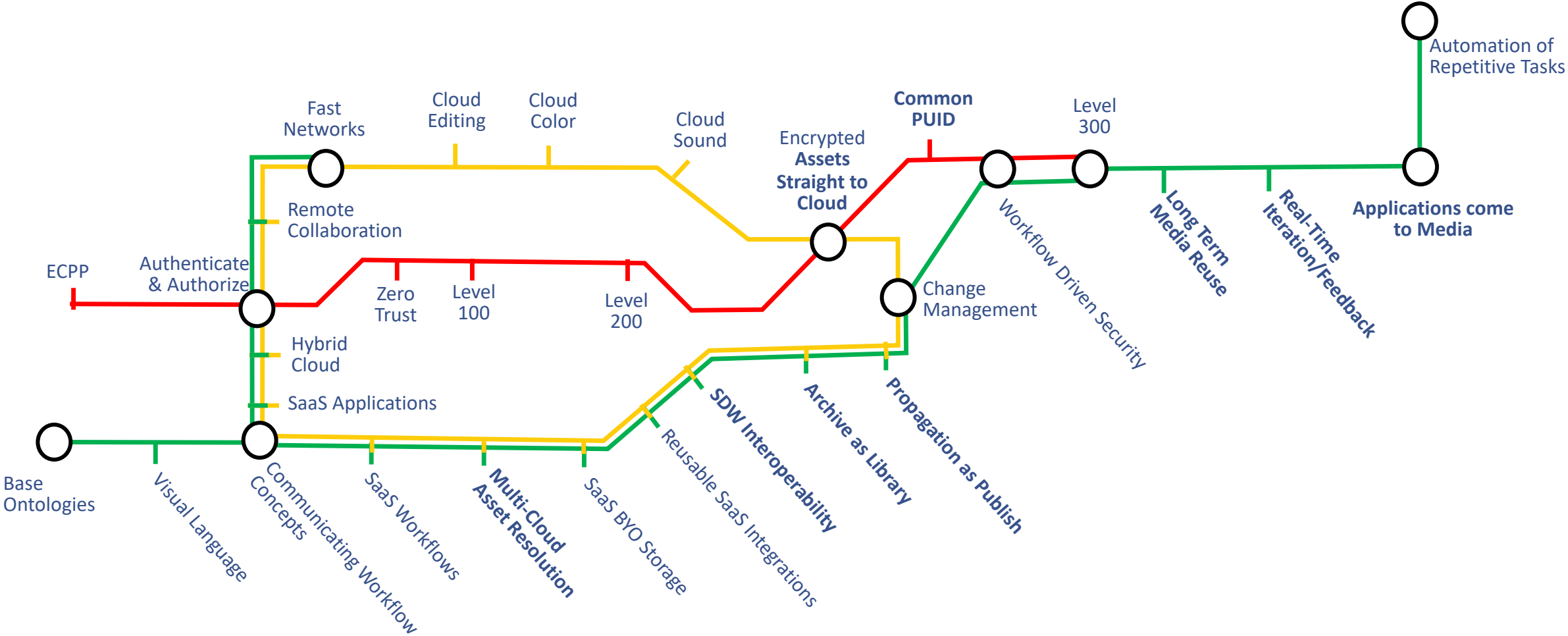
Mind the Gap

- Central Security
- The Circle of Cloud Foundations



Mind the Gap

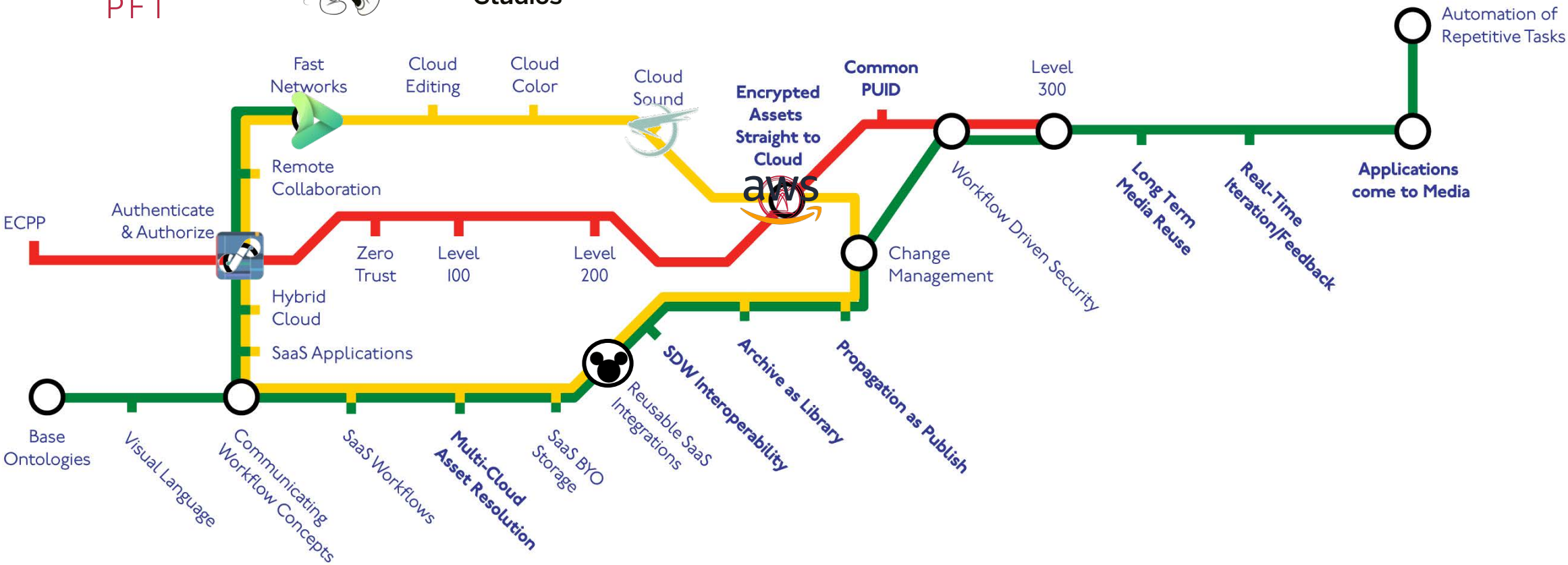
- The District of Software-Defined Workflows
- Central Security
- The Circle of Cloud Foundations



Today's Case Studies



The *WALT* Disney Studios





ProductionPro
Script, Breakdown & Media Hub

Developing 'Black Panther: Wakanda Forever' in the Cloud



ALEX LIBBY

xander@production.pro



Keeping Wakanda's Creators in Sync



ProductionPro
Script, Breakdown & Media Hub



All assets are created or ingested straight into the cloud and do not need to be moved



Propagation and distribution of assets is a “publish” function



Individual media elements are referenced, accessed, tracked and interrelated using a universal linking system





Ready, Set, Finish!

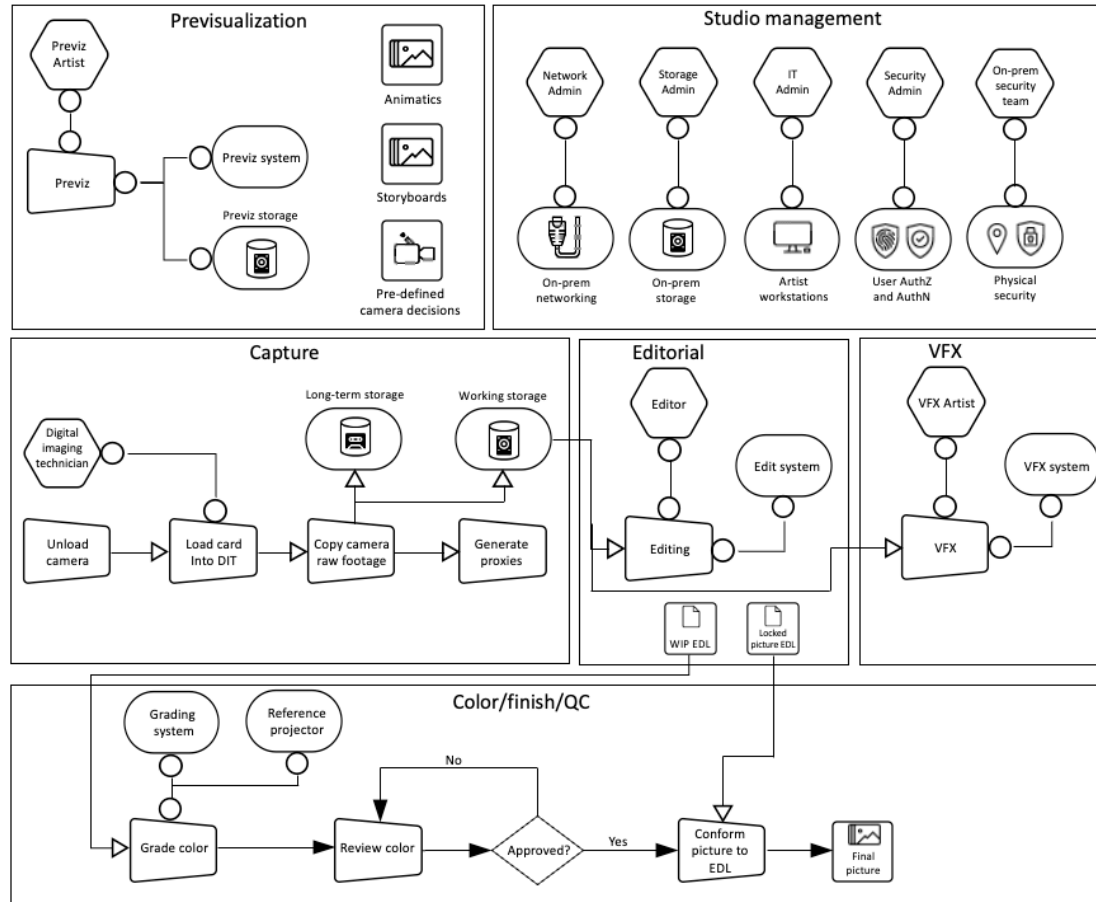
A studio in the cloud



Brandon Lindauer
blindaue@amazon.com



Traditional Post-Production Workflow



Multiple stages of data movement

Multiple copies of data

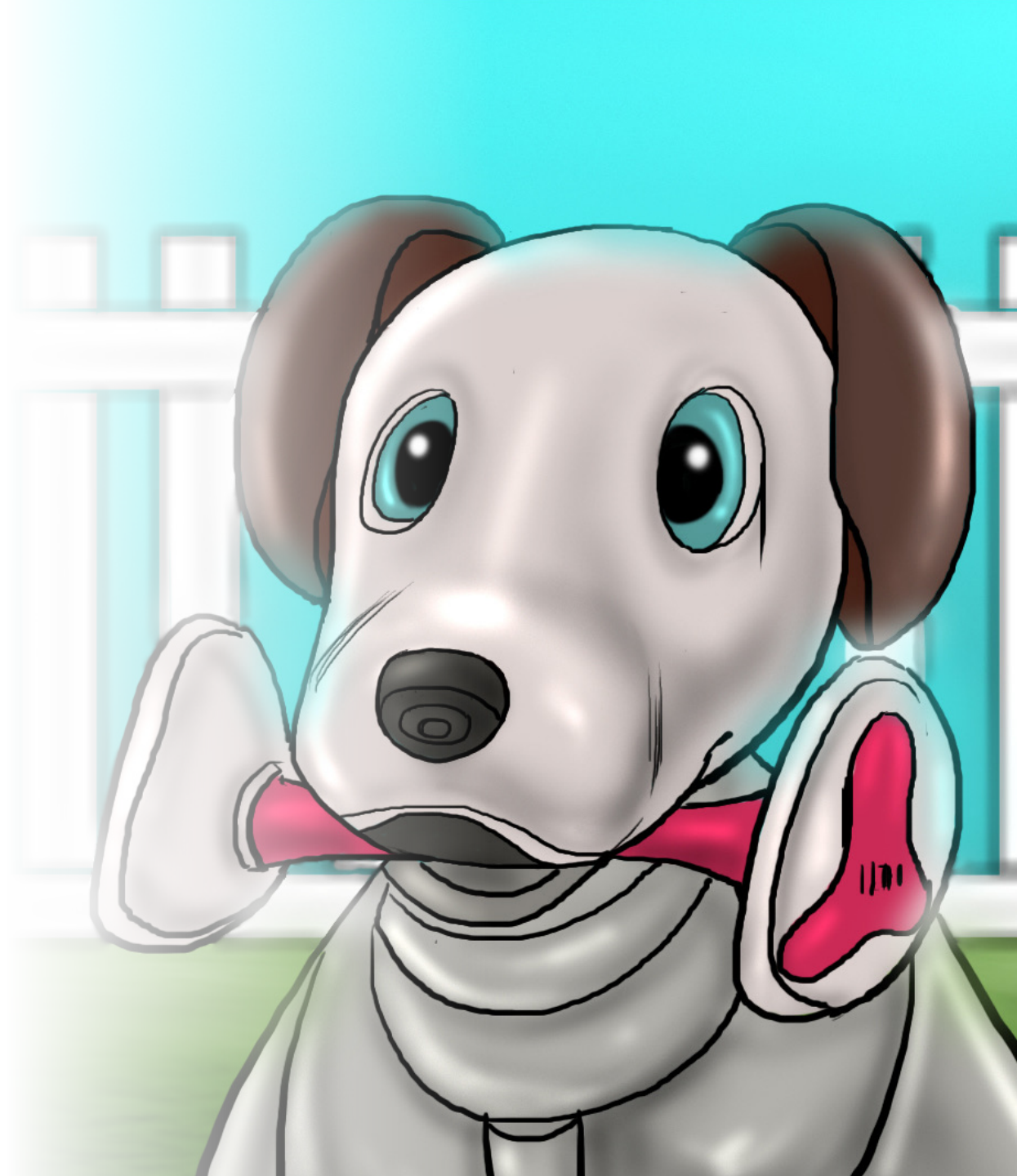
Unconnected processes

Bespoke communication

Proxy Workflows

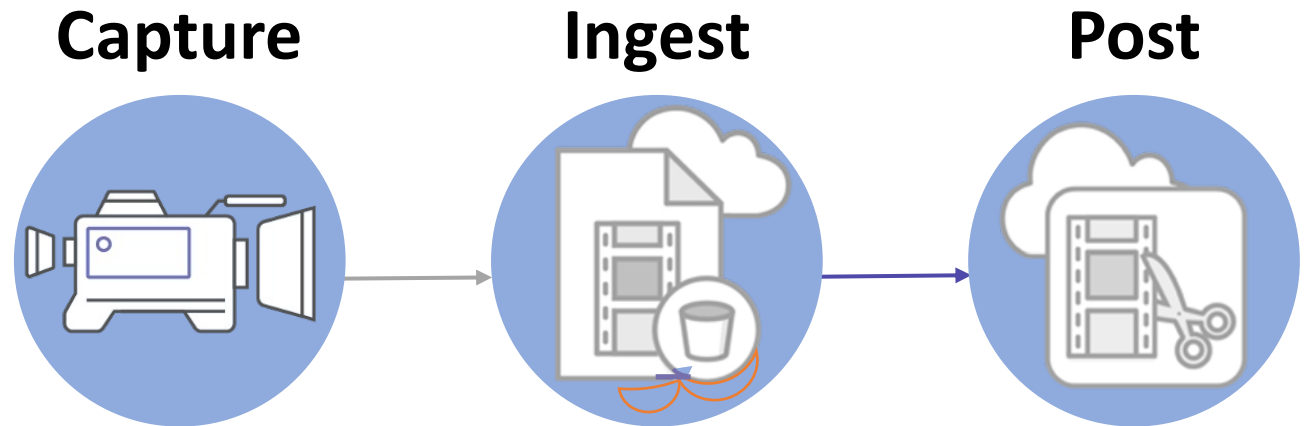
Goals

- End-to-end production in the cloud
- Real-world tools and workflows
- Seamless user experience
- Ingest to cloud

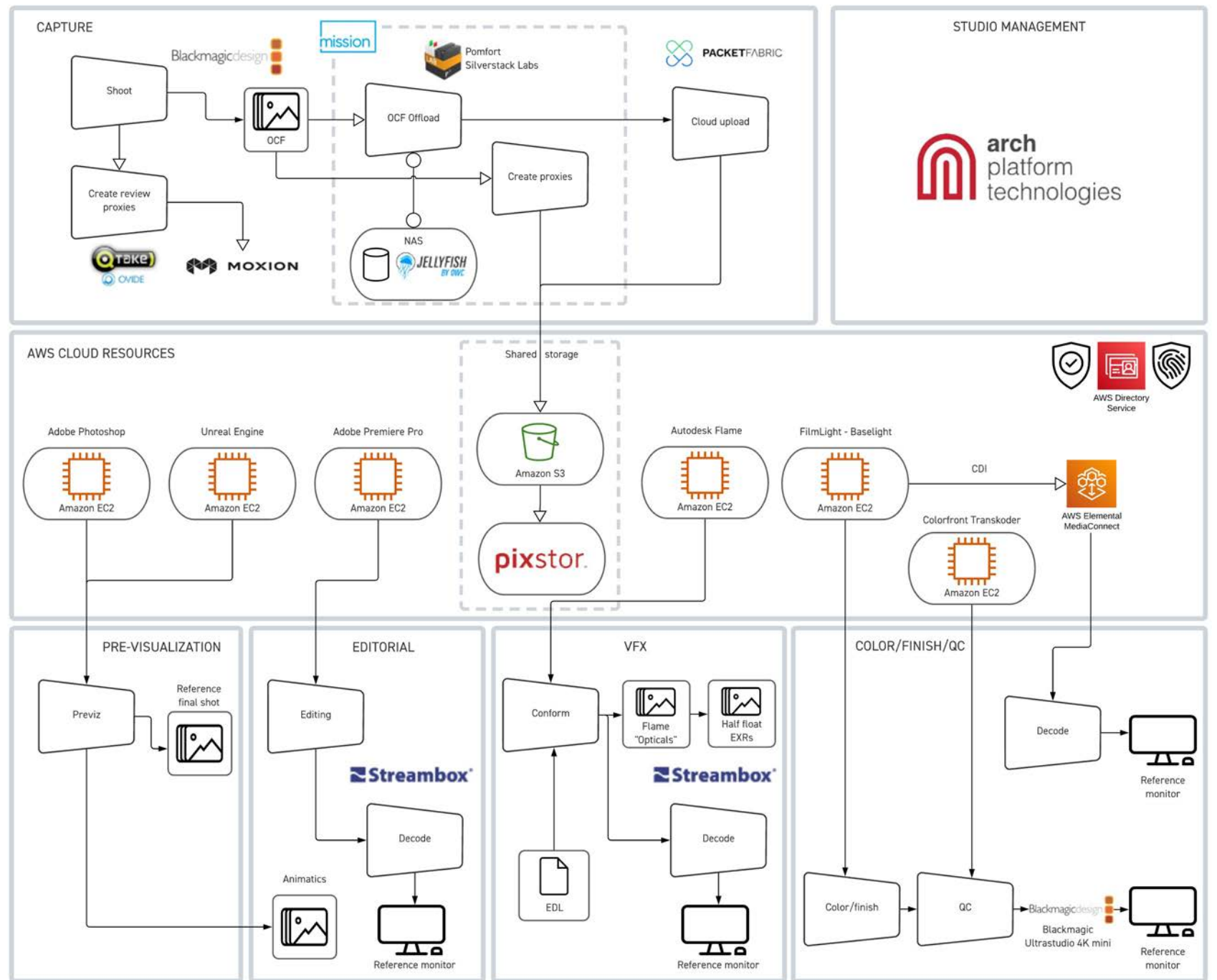


Goals

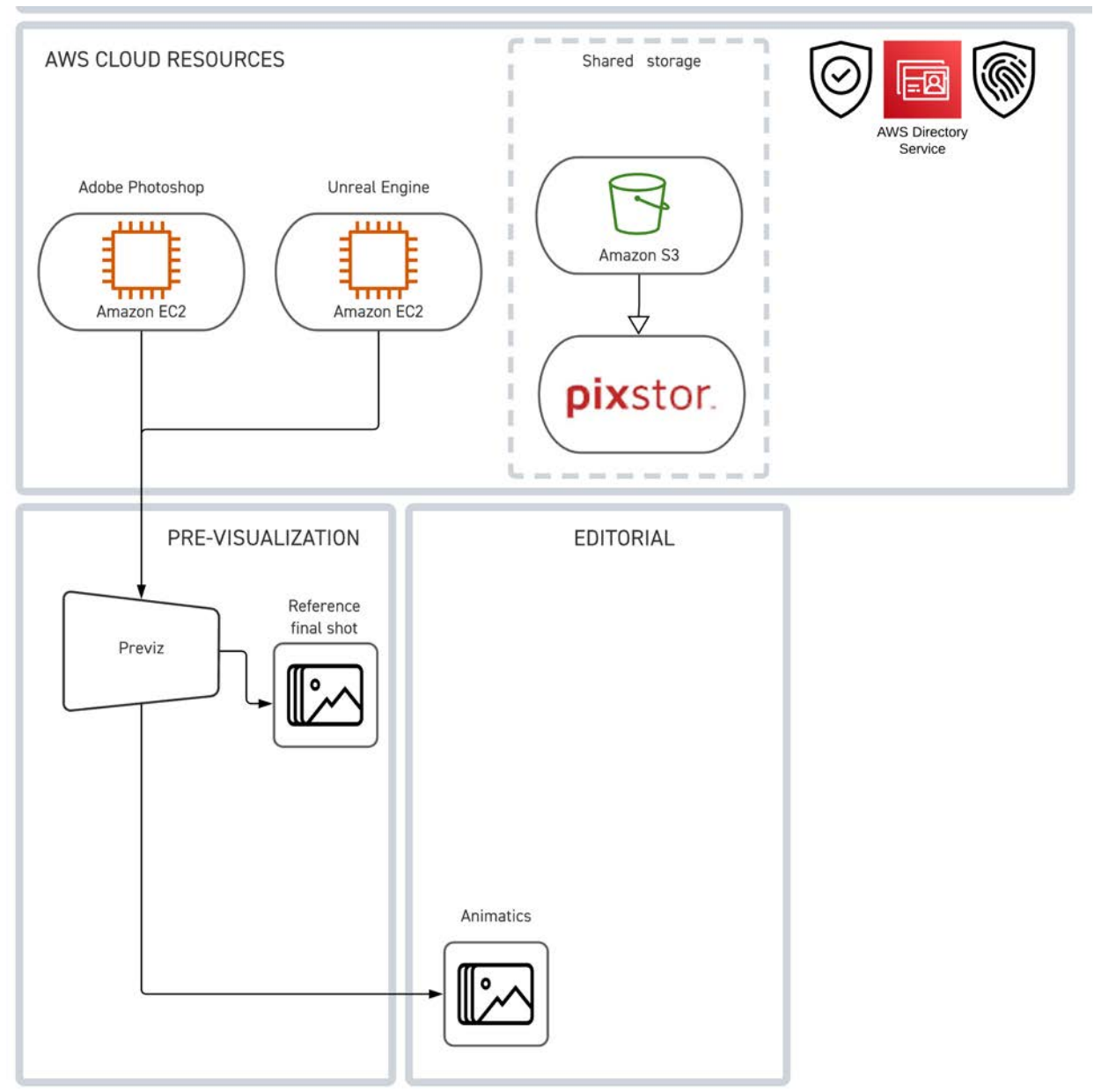
- No movement of content
- Automated workflows
- Secure environment
- Real-time iterations



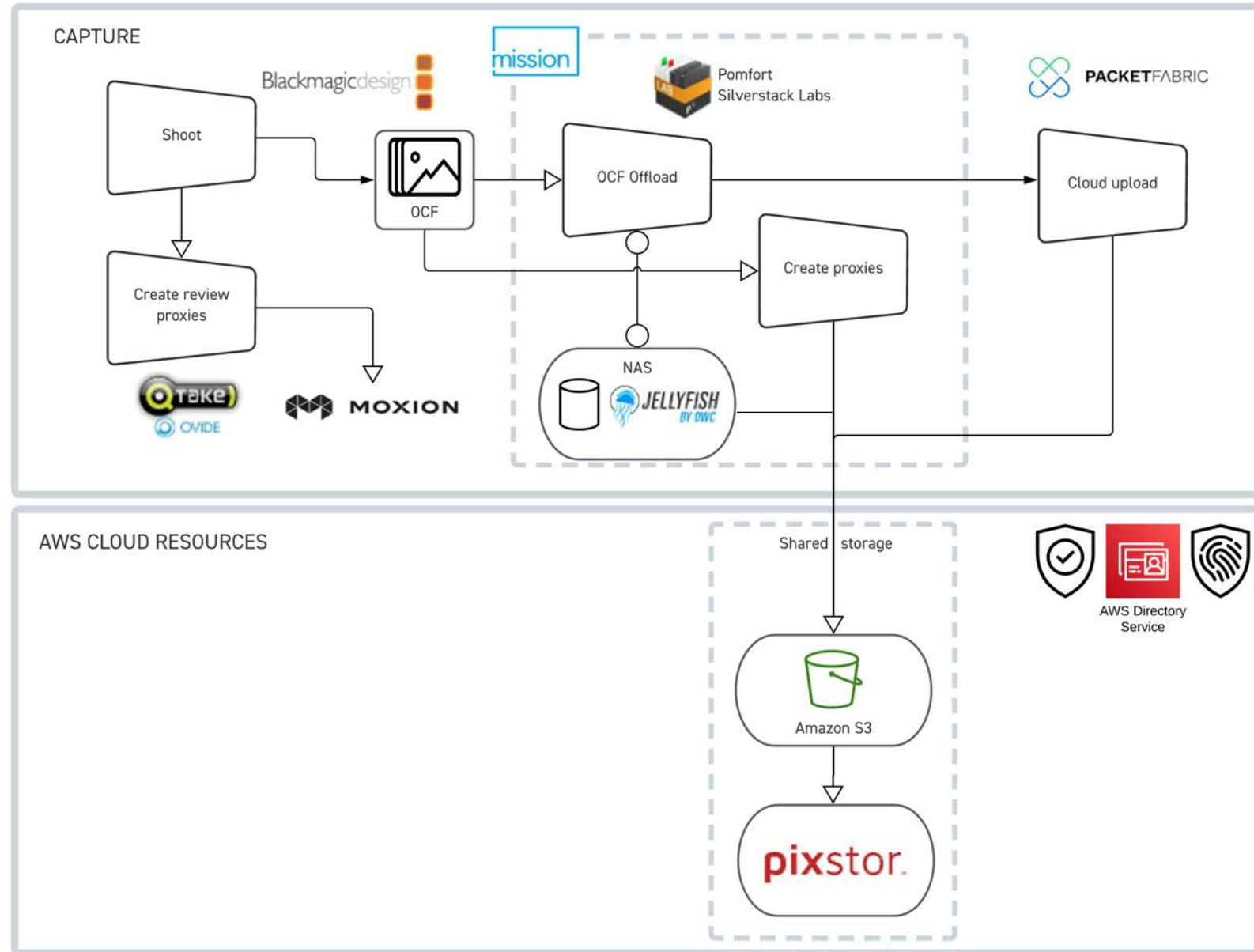
Solution



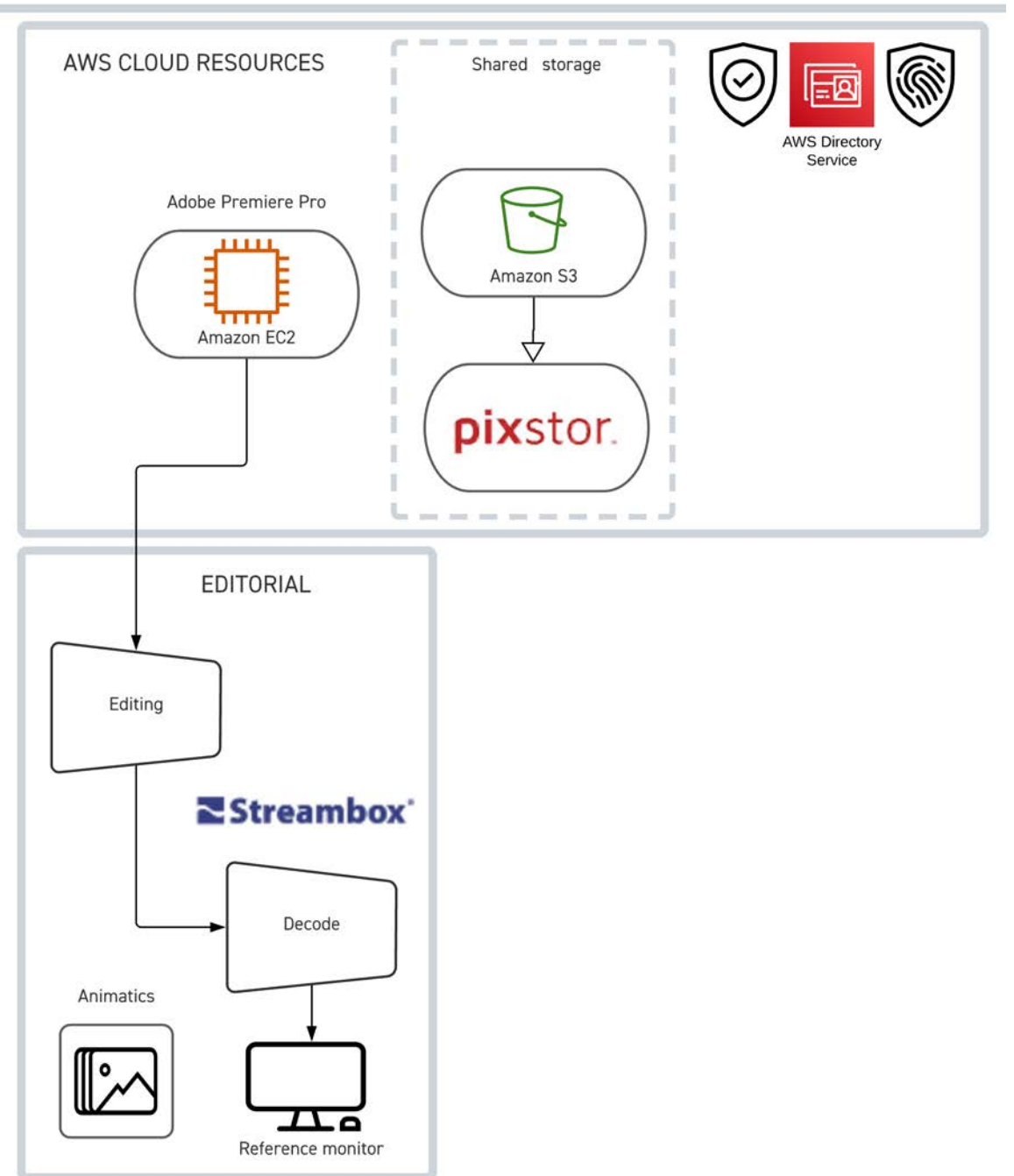
Pre-Visualization



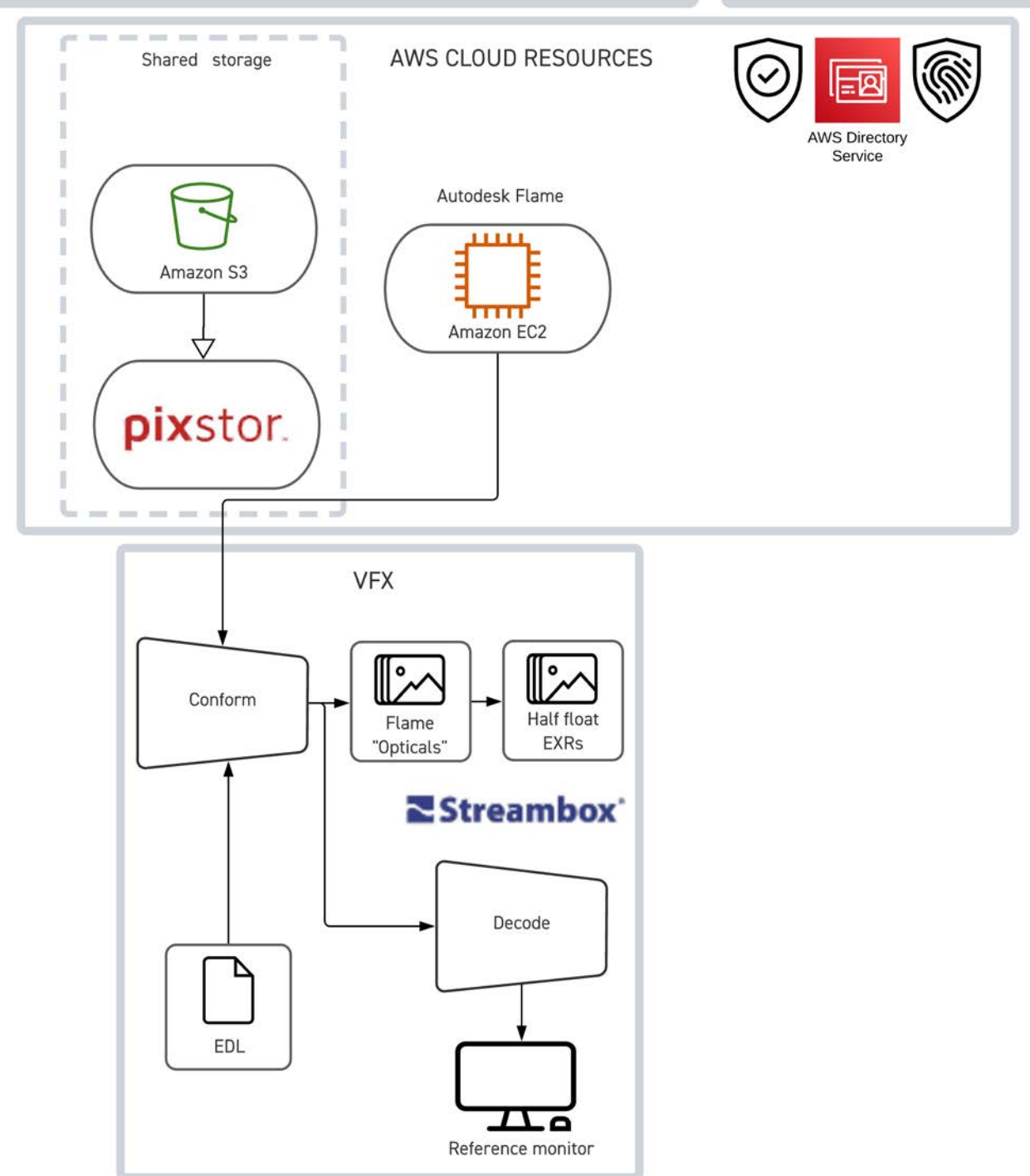
Capture



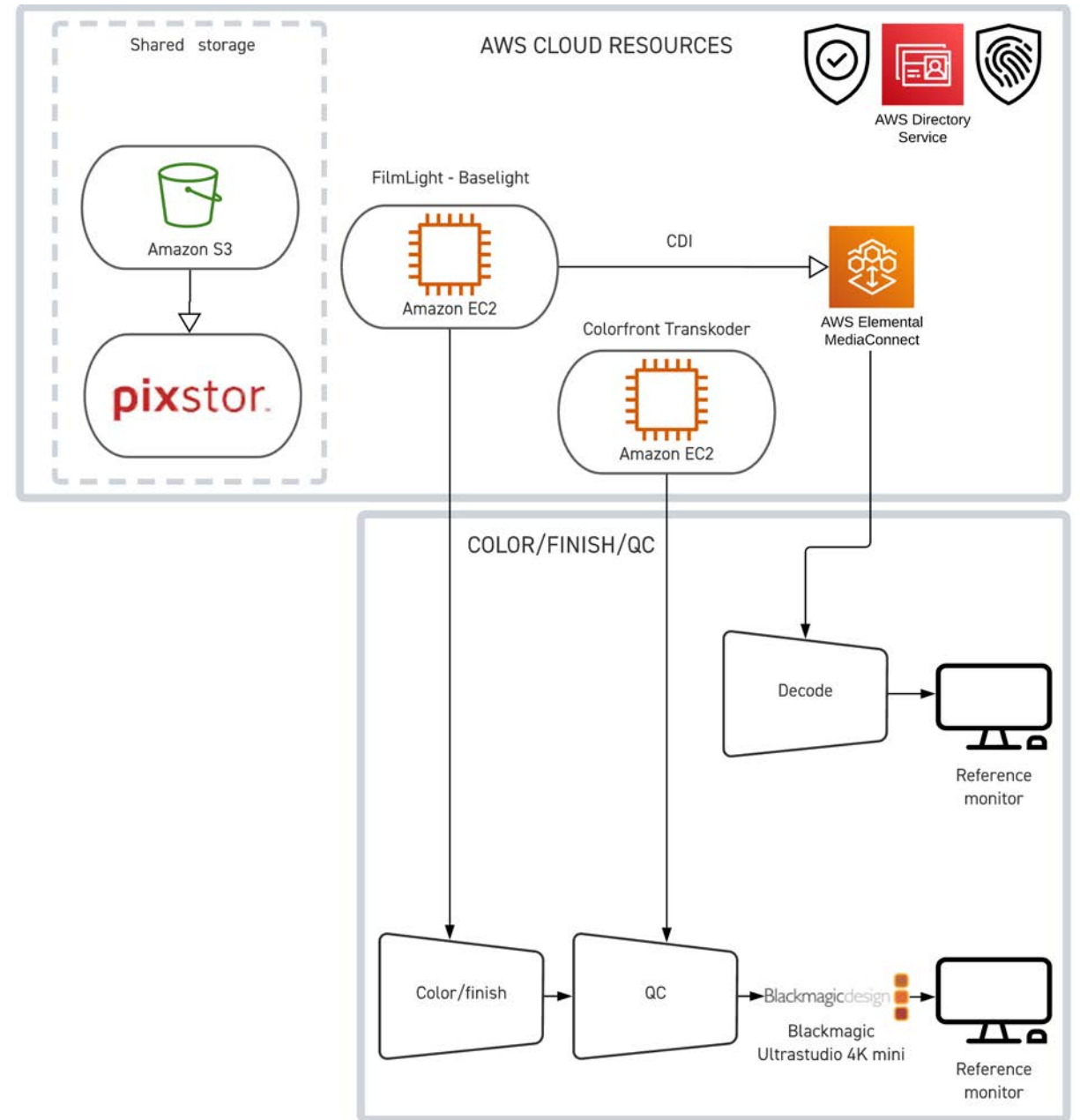
Editorial



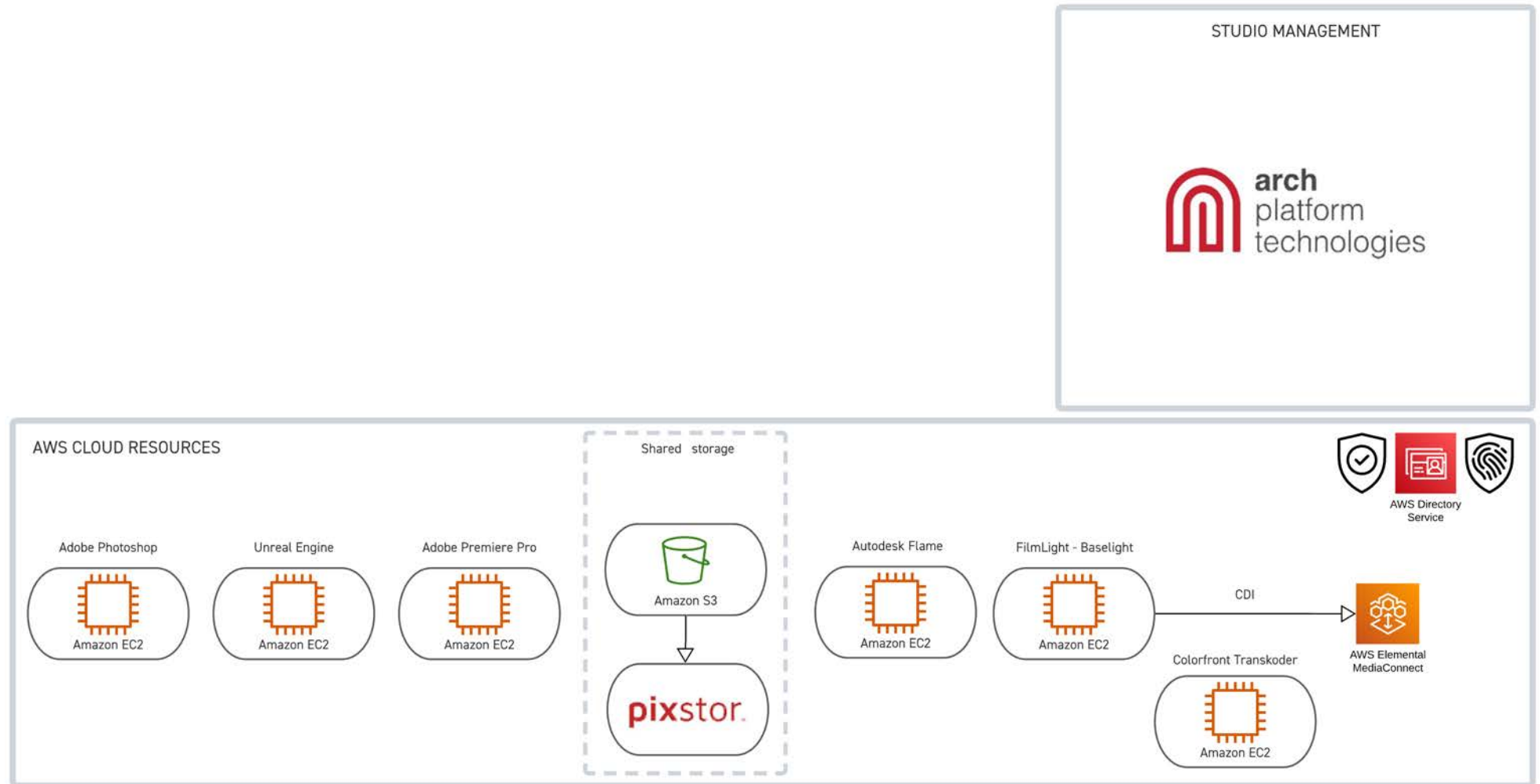
VFX



Color/Finishing/QC



Studio management



Benefits

- Operational efficiency
- Faster turnaround
- Improved reliability
- Enhanced security
- High-quality experience



16

Integrated Partners

10-BIT

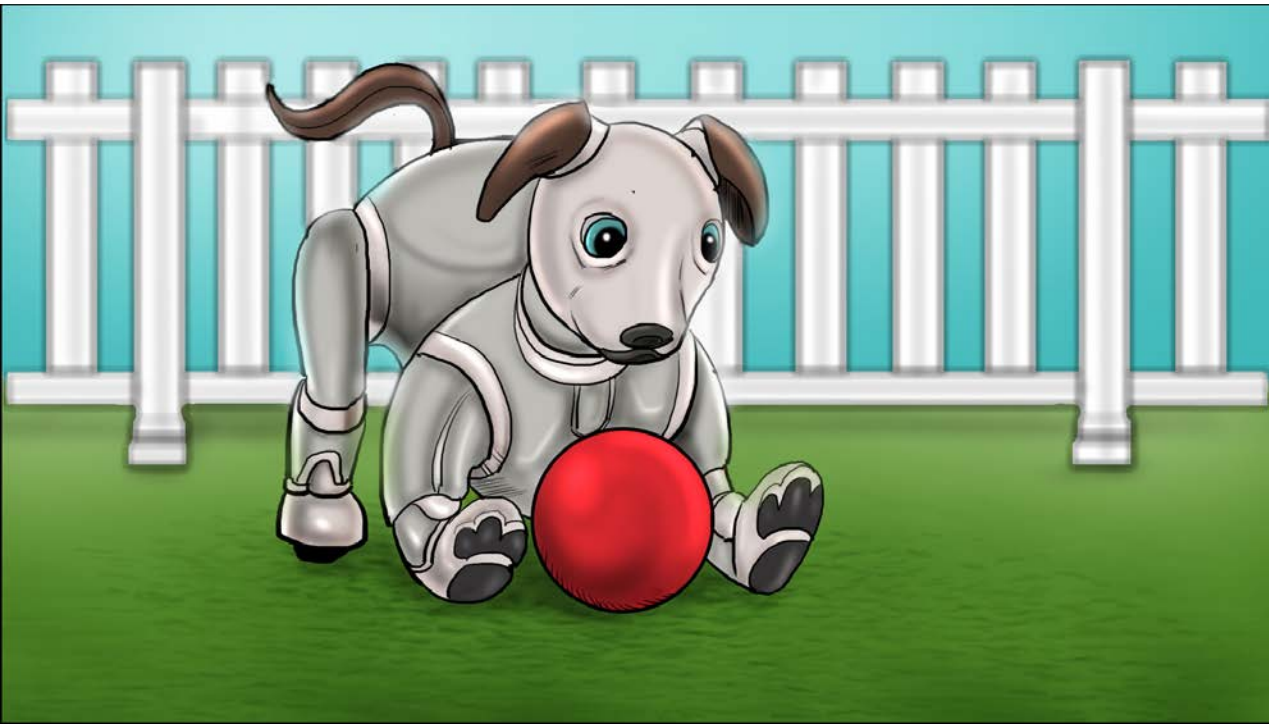
End-to-End Cloud Workflow

REAL-TIME

In-Camera VFX

Lessons Learned and Next Steps

- Cloud-based tools allow for greater flexibility
- Interoperability is paramount
- Opportunity for object storage (S3)

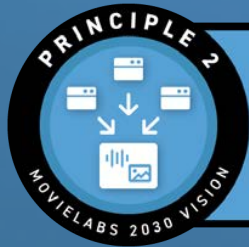


Ready, Set, Finish!

A studio in the cloud



All assets are created or ingested straight into the cloud and do not need to be moved



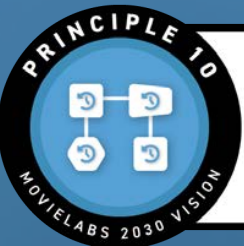
Applications come to the media



Propagation and distribution of assets is a "publish" function



Every individual on a project is identified and verified and their access permissions efficiently and consistently managed



Workflows are designed around real-time iteration and feedback





Royal Opera House Sings the Praises of Cloud Based Orchestrated Workflows



George Kilpatrick
Georgek@overcasthq.com



Before

Royal Opera Royal Ballet Orchestra

ROH is large **performance** machine, broadcaster, content producer and distributor. It was characterized by:

- **Multiple locations and archives**
- **Legacy workflows**
- **System duplication**
- **Inaccessible**
- **Reliance on specialists**

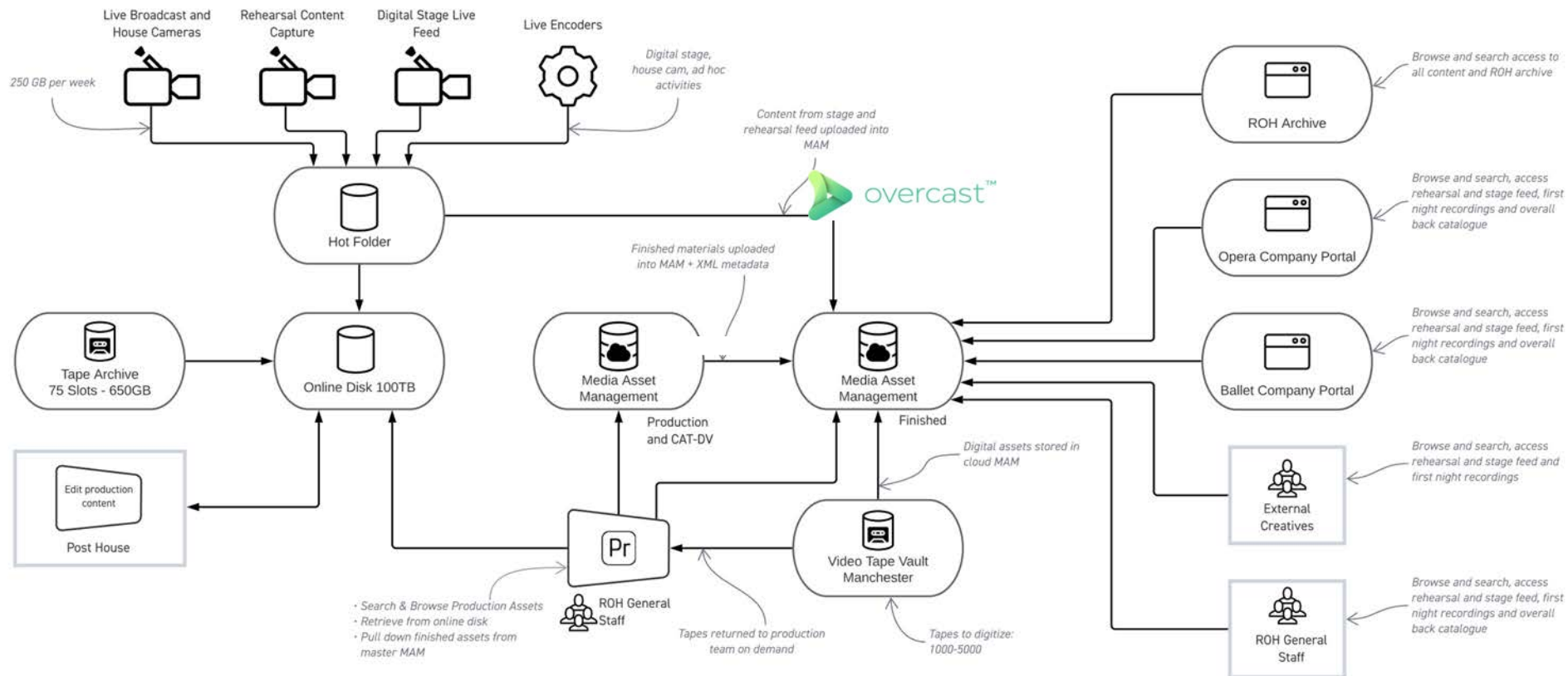
But now "Everyone is a broadcaster"



- 2000 Staff
- 70 Different shows
- 433 Individual Performances
- 1500 Live (recorded) activities
- 13 Cinema releases



- Ingest straight to cloud
- Central content repository
- Configurable and modular
- Detailed user access
- API First
- Publish assets, restrict download

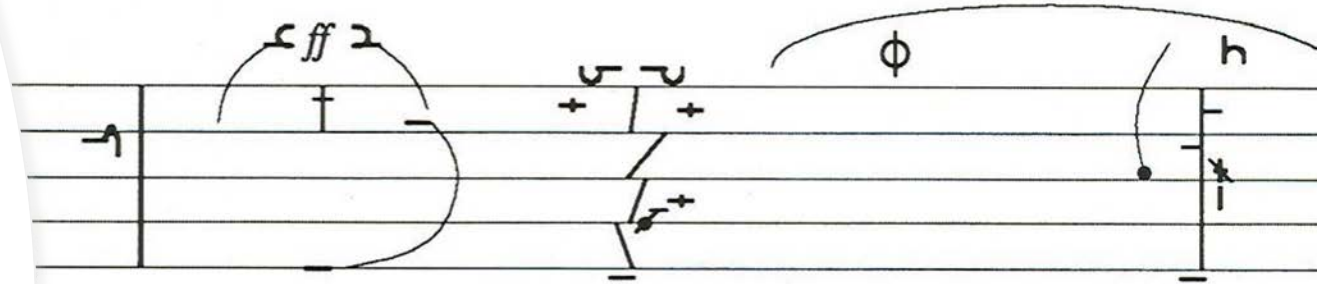


Solution Includes

- Capture of Live streams
- Chunking for central S3 storage
- Storage tier management
- Browser based
- RAW Camera ingest
- Adobe plug in for editors

Benefits

- New workflow possibilities – Rehearsal room effectiveness
- Cost reduction
- Securing content assets
- Making content accessible
- Enabling operators to complete work without specialist media skills
- Preserving internationally important recordings
- Ensuring all content can be found, edited, and monetized



Empowerment

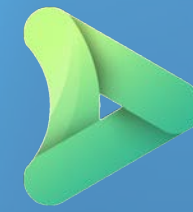


For the performers, producers, choreographers and directors

- Empower their teams
- Empower themselves

For the business and technologists

- Rationalize workflows
 - Gain control



overcast™

Royal Opera House Sings the Praises of Cloud Based Orchestrated Workflows



All assets are created or ingested straight into the cloud and do not need to be moved



Propagation and distribution of assets is a “publish” function





SKYWALKER
SOUND

Skywalker Keeps the Humanity in Automated Soundtrack Mastering



Scott Levine
slevine@skysound.com





1995

20
THEATRICAL
VERSIONS



2018

750 THEATRICAL
VERSIONS



2022

1000+ THEATRICAL
VERSIONS



Why so many audio versions?



Multiple Playback Formats



Loudness Regulations for Broadcast / Streaming



Editorial for Repurposing



Framerate Conversion for Repurposing



Dedicated Home Theater Mixes



Multiple Encoding Options



How do we manage the explosion of versions?

... while still enabling “snowflake” variations?





Art



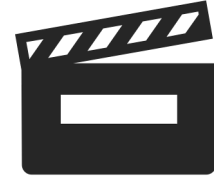
Technology



Process



Art



- Technology built with creatives, not for creatives
- Perceptual and preference testing
- Knobs for prototype tuning
- Style-matching



Technology



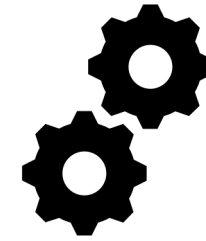
- Signal Processing Built From Scratch
- AI / ML trained and optimized

some examples:

- Advanced Dynamic Range Control
- Loudness Compliance / Targeted True Peak
- Adaptive Format Conversion
- Framerate Conversion
- Sampling Rate Conversion / Dither



Process

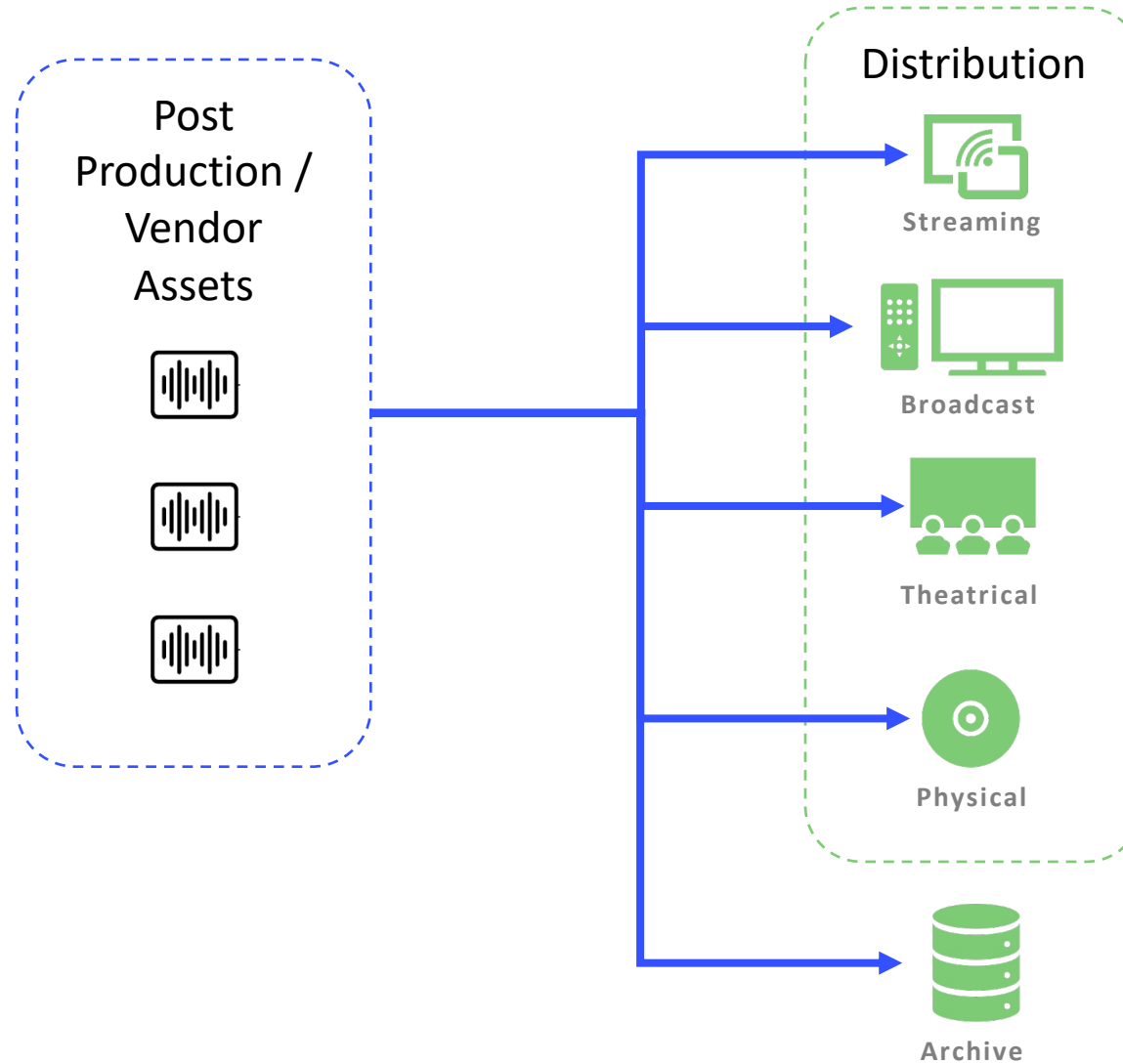


Challenge:

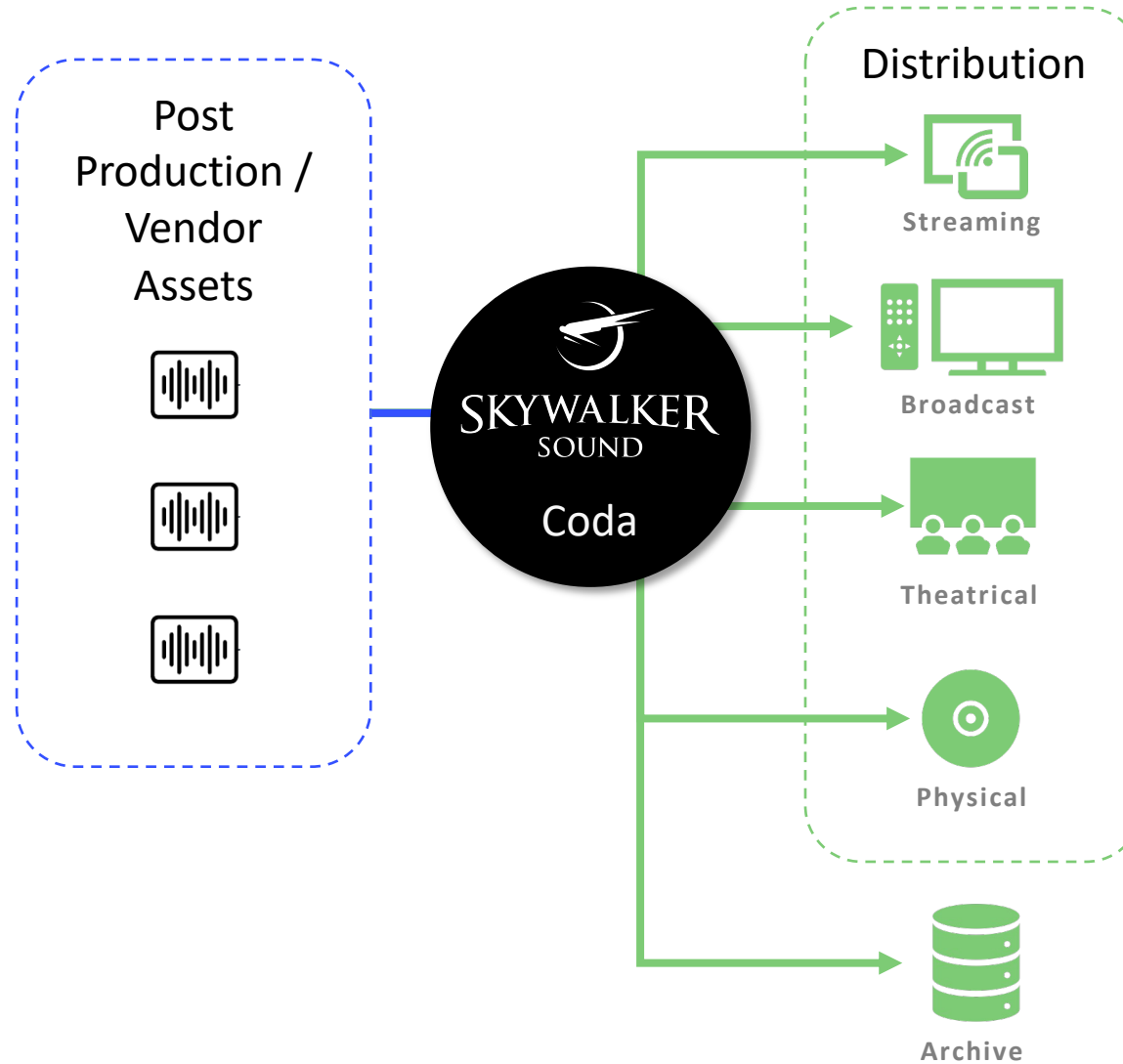
- Standard methods / techniques in established workflows are worth upholding.
- Automation needs direction.
- Build institutional knowledge into automation, without explicit sequence workflows.
- Build snowflake-ready workflow engine.



Skywalker “Coda” Solution & Architecture



Skywalker “Coda” Solution & Architecture



- Intelligent Workflow Engine
- Creates Dynamic ‘Self Determining’ Workflows
- Unique “Work Order-Less” Workflow

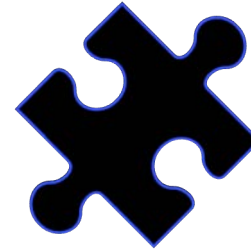


Self-Declaring Skills

Intelligent Workflow Engine



Loudness Correction



```
{  
  "input": audio,  
  "output": audio,  
  "works_on": [  
    "dialog_loudness",  
    "program_loudness",  
    "short_term_loudness",  
    "momentary_loudness"  
  ]  
}
```

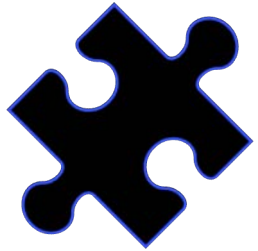
- Extensible workflow components
- Self-Declare their capabilities and requirements



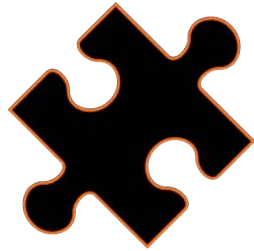
Intelligent Workflow Engine



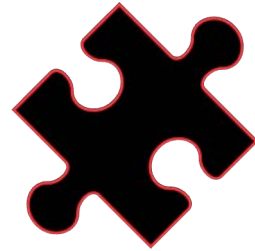
Loudness Correction



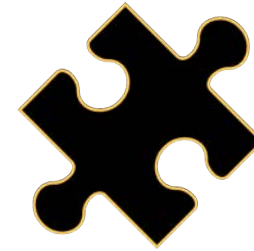
True Peak



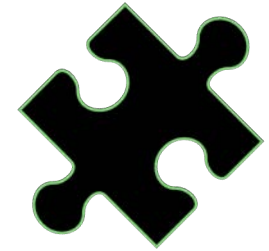
Framerate Conversion



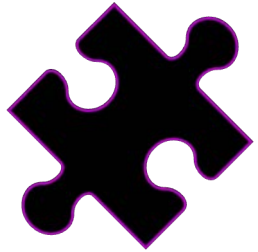
Encoding



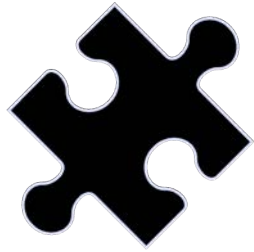
Data IO



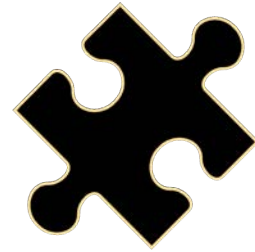
Mapping



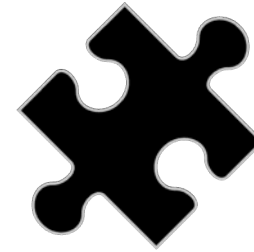
Summing



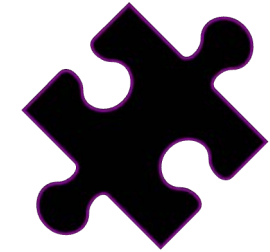
Dynamic Range Control



File Renaming



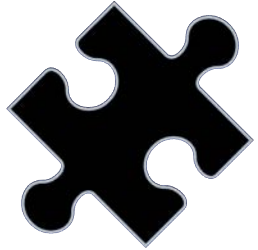
Adaptive Downmix



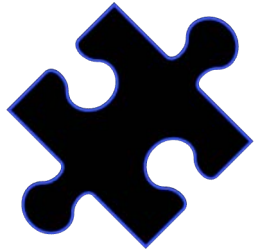
Intelligent Workflow Engine



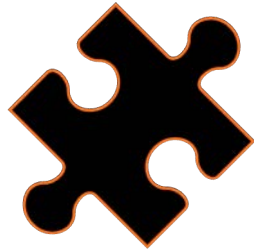
Dialog Removal



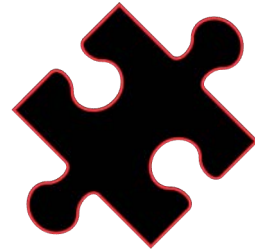
Loudness Correction



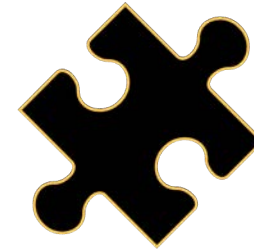
True Peak



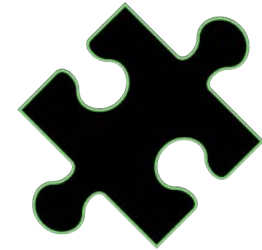
Framerate Conversion



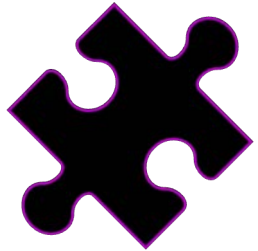
Encoding



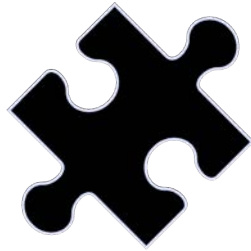
Data IO



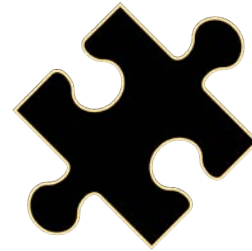
Mapping



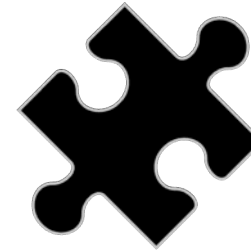
Summing



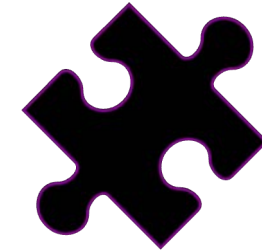
Dynamic Range Control



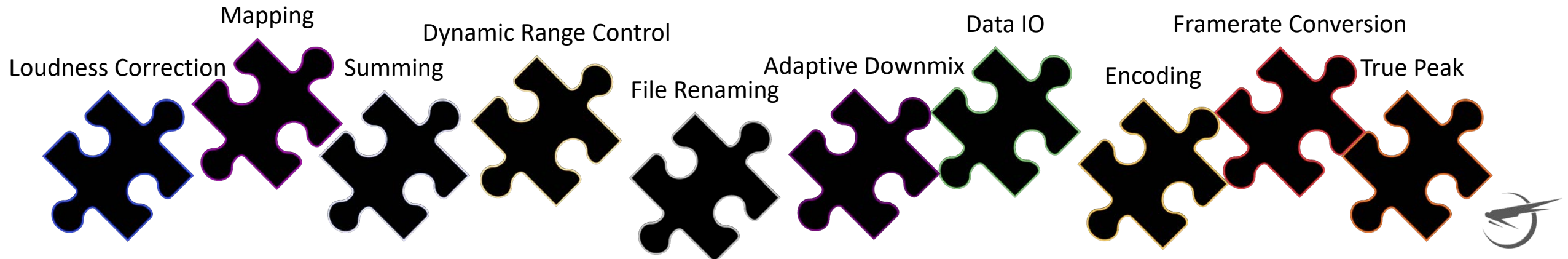
File Renaming



Adaptive Downmix



Intelligent Workflow Engine



Intelligent Workflow Engine



Post
Production



ATMOS
Theatrical Mix
Stems
MX
FFFX



ATMOS
Theatrical
Foreign Dialog
Stem

Distribution

MXF DCP



Mapping

Dynamic Range Control

Data IO

Framerate Conversion

Loudness Correction

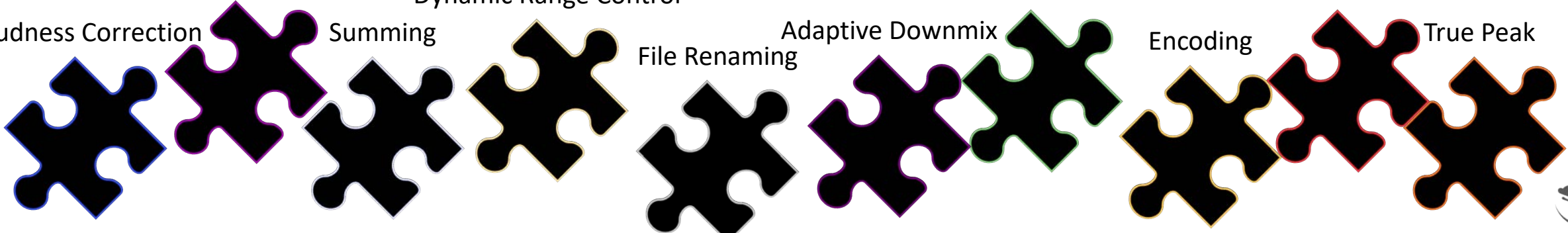
Summing

File Renaming

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Intelligent Workflow Engine



Post Production



ATMOS
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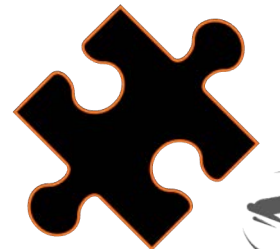
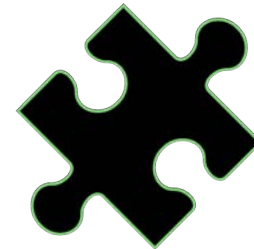
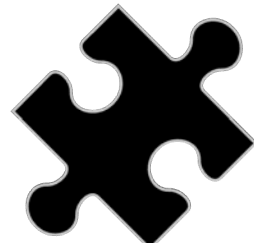
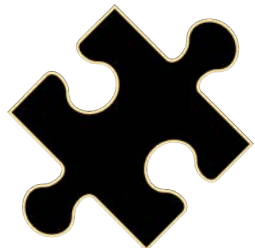
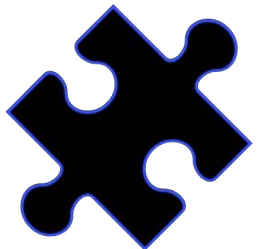
Dynamic Range Control

File Renaming

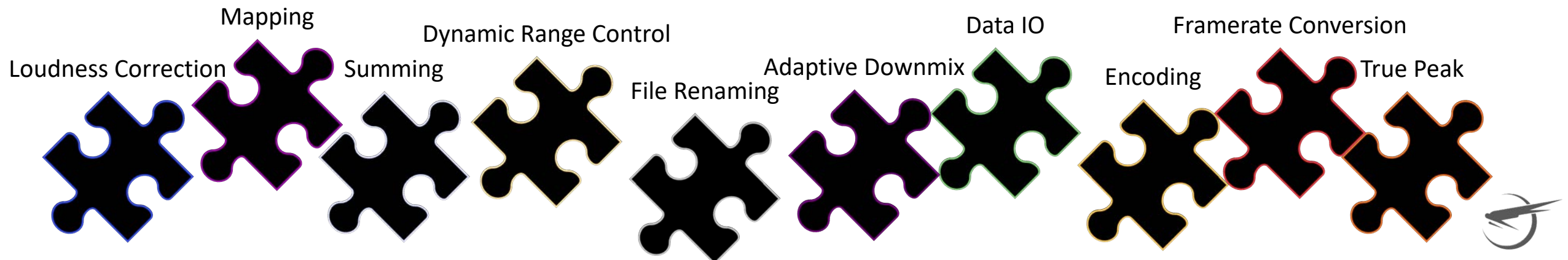
Data IO

True Peak

Loudness Correction



Intelligent Workflow Engine



Intelligent Workflow Engine



Post
Production



ATMOS
Theatrical Mix
Stems
MX
FFFX



ATMOS
Theatrical
Foreign Dialog
Stem

Distribution

Home
Theater
Deliverables



Mapping

Dynamic Range Control

Data IO

Framerate Conversion

Loudness Correction

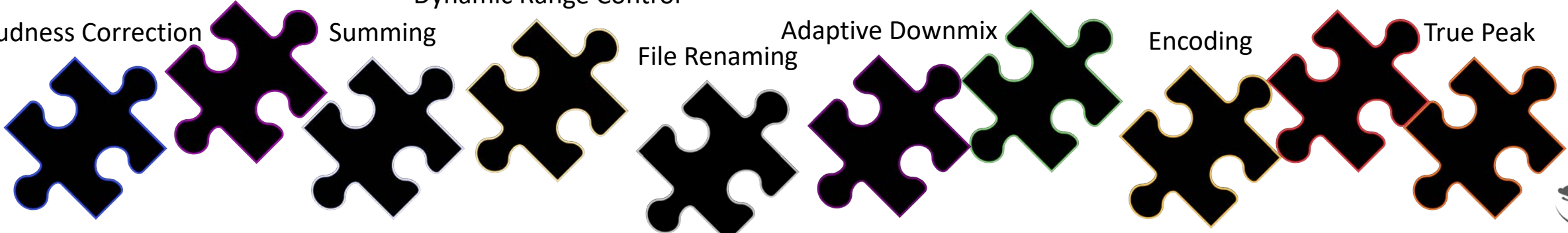
Summing

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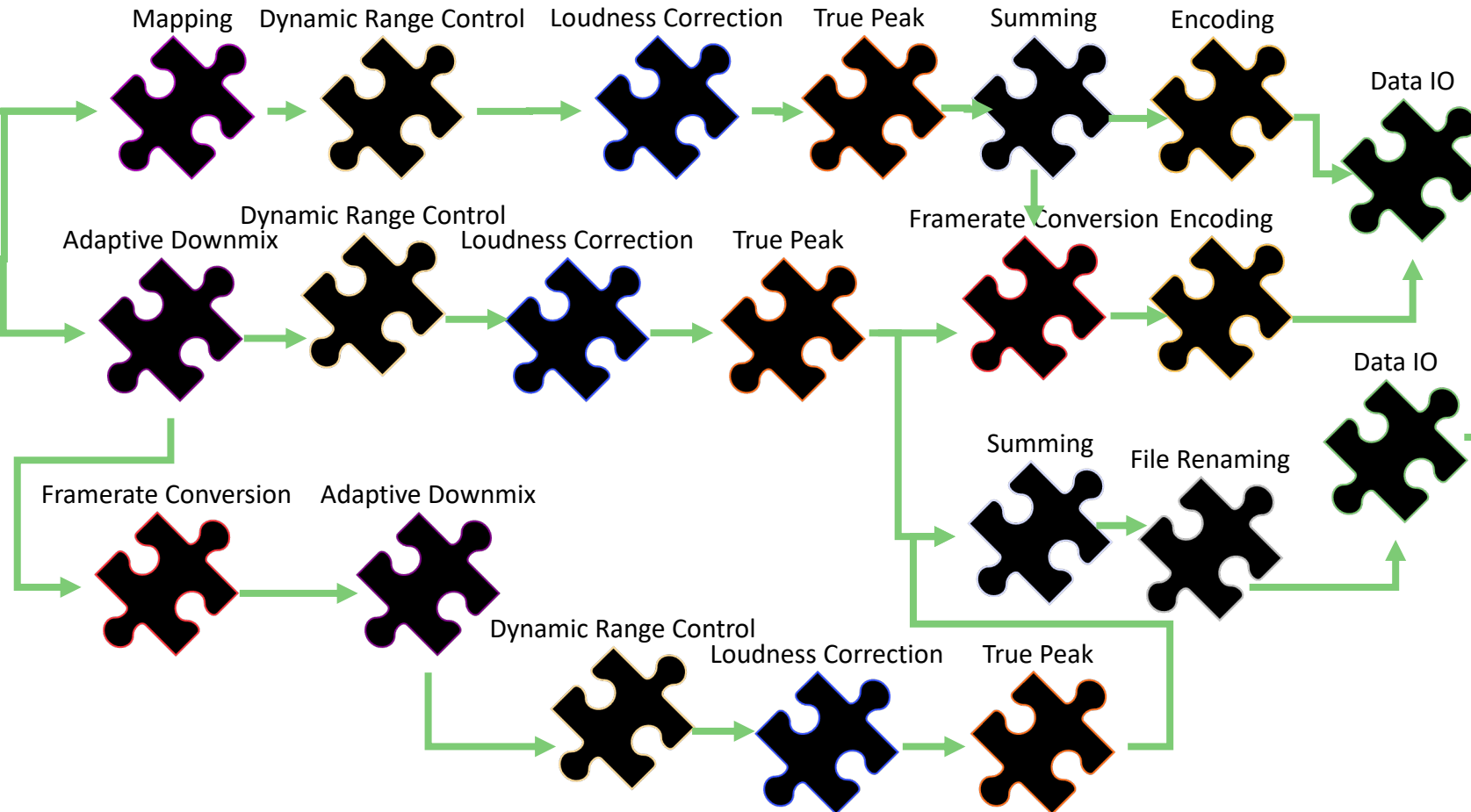
True Peak



Intelligent Workflow Engine



Post Production

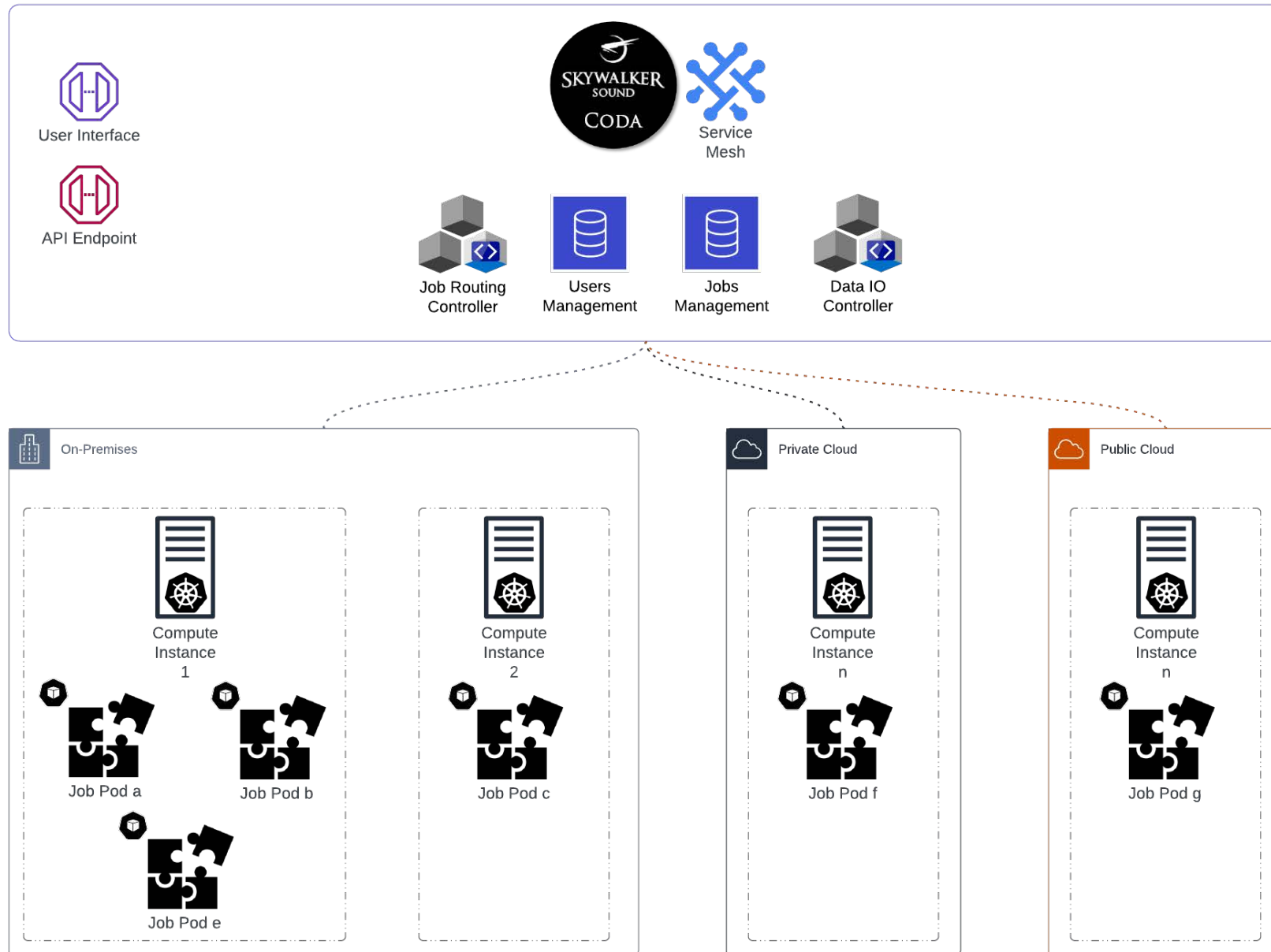


Distribution

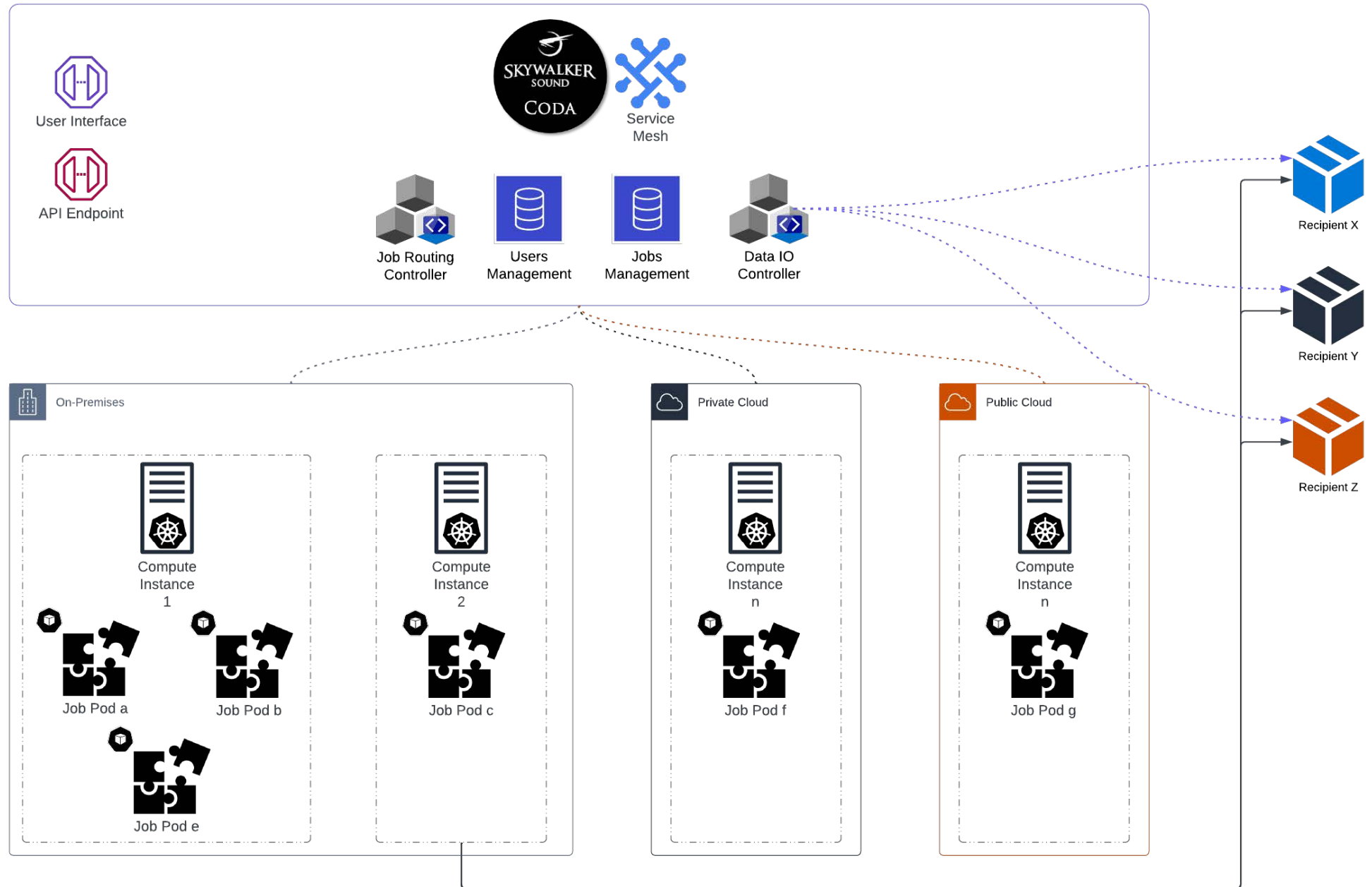
Home Theater Deliverables



Scalable Platform Architecture



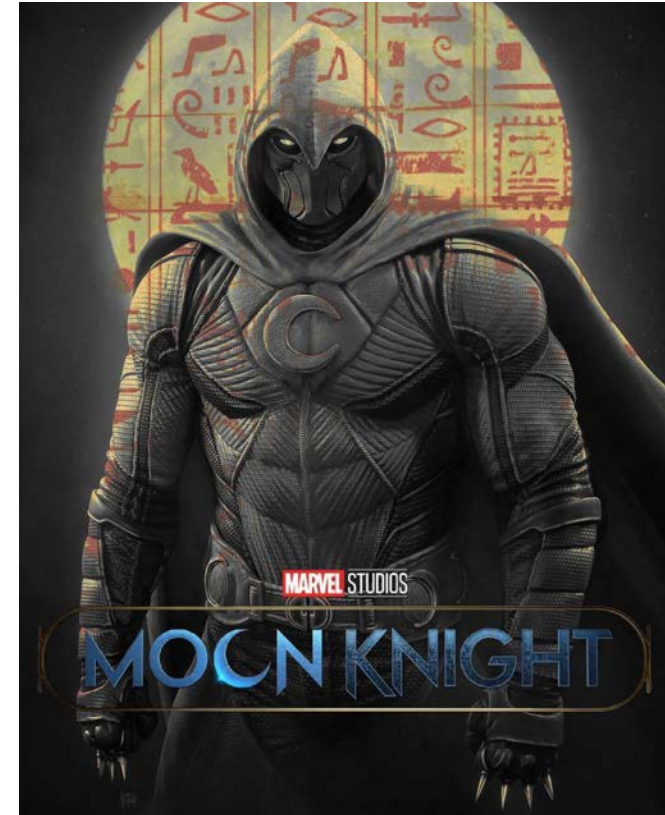
Scalable Platform Architecture



Successfully Used On...



Disney + "Mandalorian" Season 3



Disney + "Moon Knight" Season 1

...reduced 1 day per episode
down to **30 minutes** per episode



Time Savings...

Theatrical Feature Film (domestic version)

- Current: 3 weeks of mastering:
 - Printmaster, IMAX, Home Theater versions
- With Coda: **1 hour** automated processing
- Savings: 50 hours of mix room, mixer, editors



Lessons Learned

1. Everything in M&E workflows needs to be scalable – skills, databases, infrastructure
 - Enables flexibility and continuous updates of individual modules
2. APIs make good neighbors!
 - For incoming services
 - Providing customer flexibility to extend
3. Workflow considerations for audio translate to other domains

Next Steps

1. More Audio Skills
2. Support for non-audio skills to build other workflow types





Art



Technology



Process



Skywalker Keeps the Humanity in Automated Soundtrack Mastering



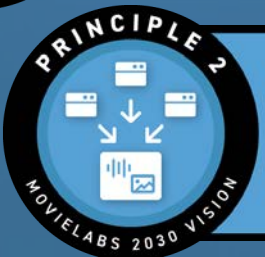
SKYWALKER
SOUND



PRINCIPLE 1

MOVIELABS 2030 VISION

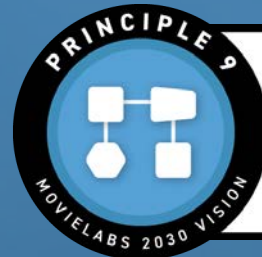
All assets are created or ingested straight into the cloud and do not need to be moved



PRINCIPLE 2

MOVIELABS 2030 VISION

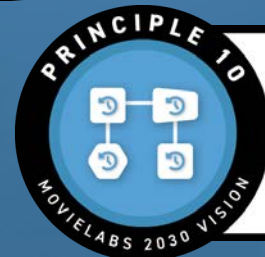
Applications come to the media



PRINCIPLE 9

MOVIELABS 2030 VISION

Media workflows are non-destructive and dynamically created using common interfaces, underlying data formats and metadata



PRINCIPLE 10

MOVIELABS 2030 VISION

Workflows are designed around real-time iteration and feedback



Prime Focus Technologies Creates Channel 4's Multi- Vendor Cloud Supply Chain

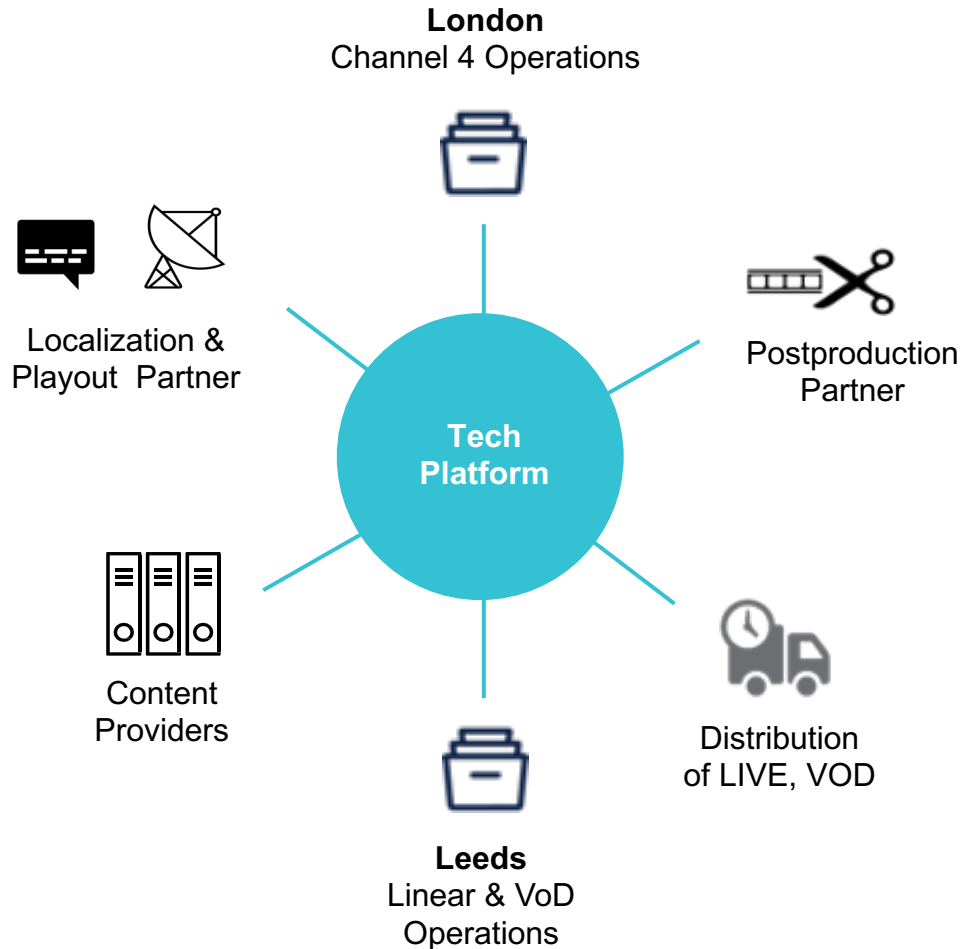


Rohan Warey

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Before Scenario



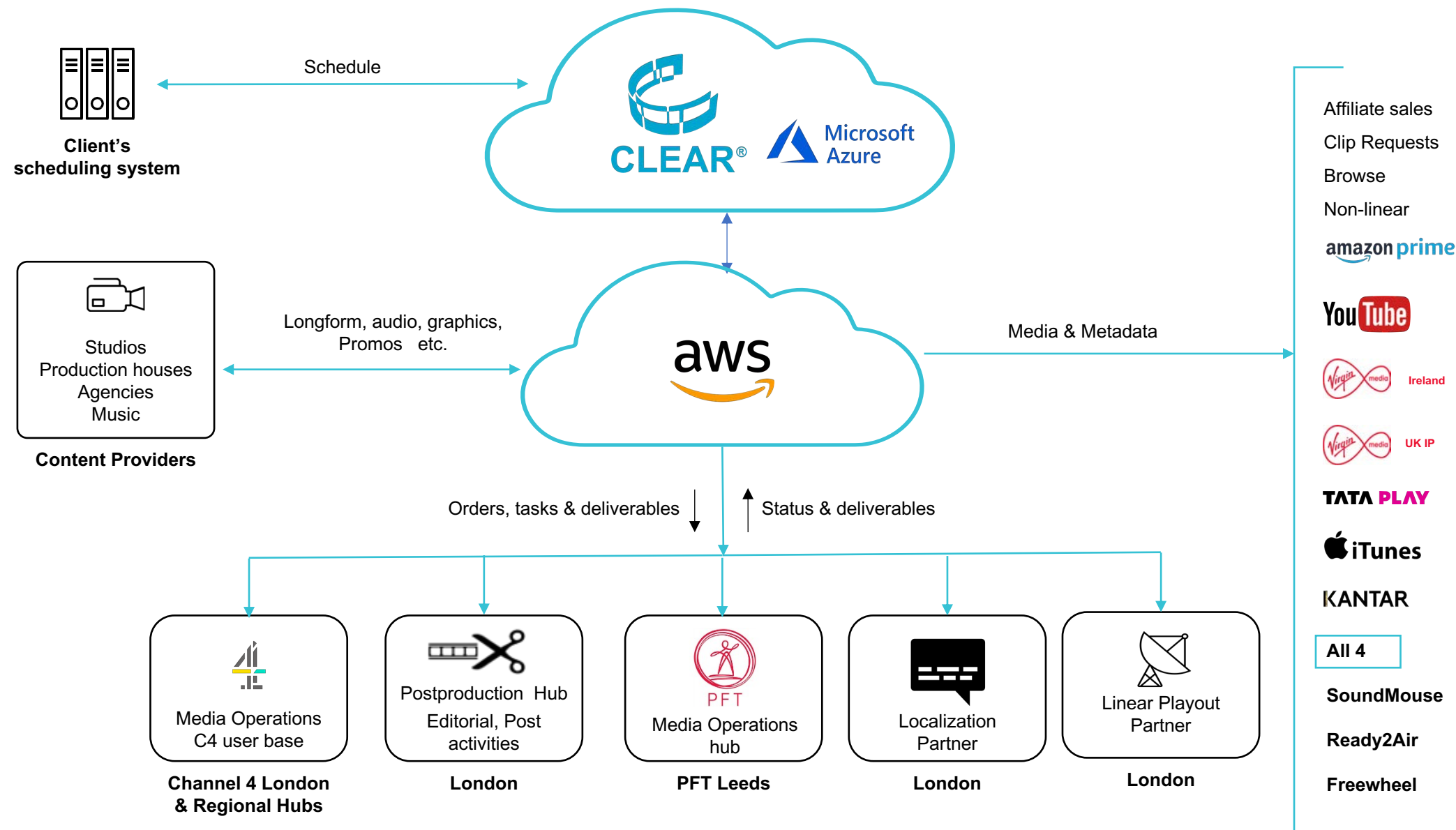
BACKGROUND

- Channel 4 – Leading public broadcaster in the UK. “Publisher – Broadcaster”
- 7.5 PB of legacy media – parted content, disparate secondary elements
- Single vendor to manage media operations - limited visibility & reporting across the supply chain
- Lack of elasticity to scale up quickly during volume peaks

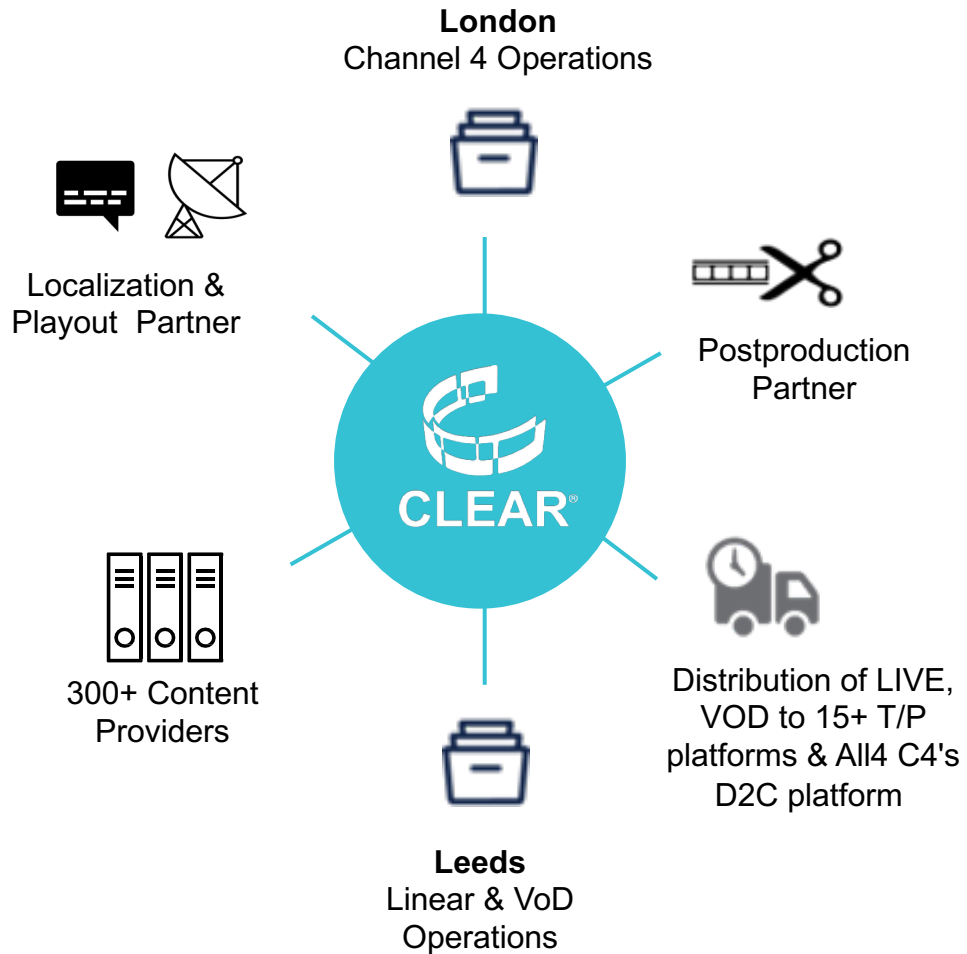
SCOPE

- Transition from a single supplier to a Multi-Vendor Network; API led integration to all Supplier systems
- Transformation of Linear & Digital Supply Chain
- Centralization, Taking control. Scale dynamically in the cloud
- Automation - Workflows for Linear, VOD, Live to VOD, Simulcast

Solution & Architecture



Benefits



Connected Multi-Vendor Supply Chain Network for linear & digital operations.

Automated task management & tracking across multiple suppliers & partners

Complete visibility into operations across vendors and manage diverse processes through real-time dashboards

Enable monetization – Ready, serviceable media that can be packaged & delivered to multiple end points

Scale of Operations

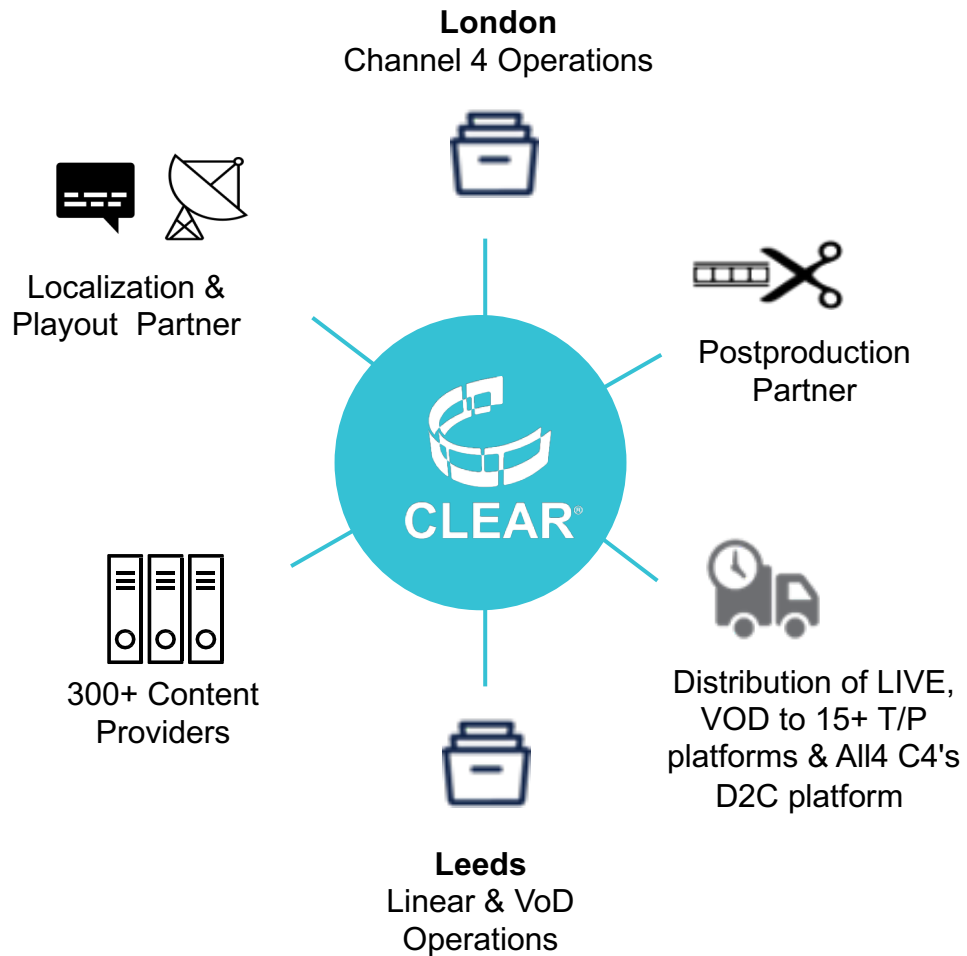
*Migrated **1.65 Million assets** (7.5PB) of content the cloud*

*On boarded **300+** Content Providers*

*Automated **ingest** for **17,000 hours** per year*

~10,000 hours** of monthly **VOD** output to **15+ destinations

Lessons Learned and Next Steps



Solve for managing the “business process” and not just the “assets”

Move away from automation in silos to a connected ecosystem – Title based view of the supply chain

Hybrid Cloud - Seamlessly work across sites (on premise, cloud) and utilize compute, storage & resources

Automation - Assets, work orders and tasks orchestrated via ONE system

Advanced Schedule, Supply Chain demand forecasting, ordering, media logistics

*Solving for Aggressive SLAs - Live to VOD 10% Program Length
- Intelligent Split & Stitch processing in the Cloud*

Prime Focus Technologies Creates a Channel 4 Multi- Vendor Supply Chains



All assets are created or ingested straight into the cloud and do not need to be moved



Applications come to the media



Propagation and distribution of assets is a “publish” function





The *WALT DISNEY*
Studios

Marvel Studios Cinematic Universe Editorial Library

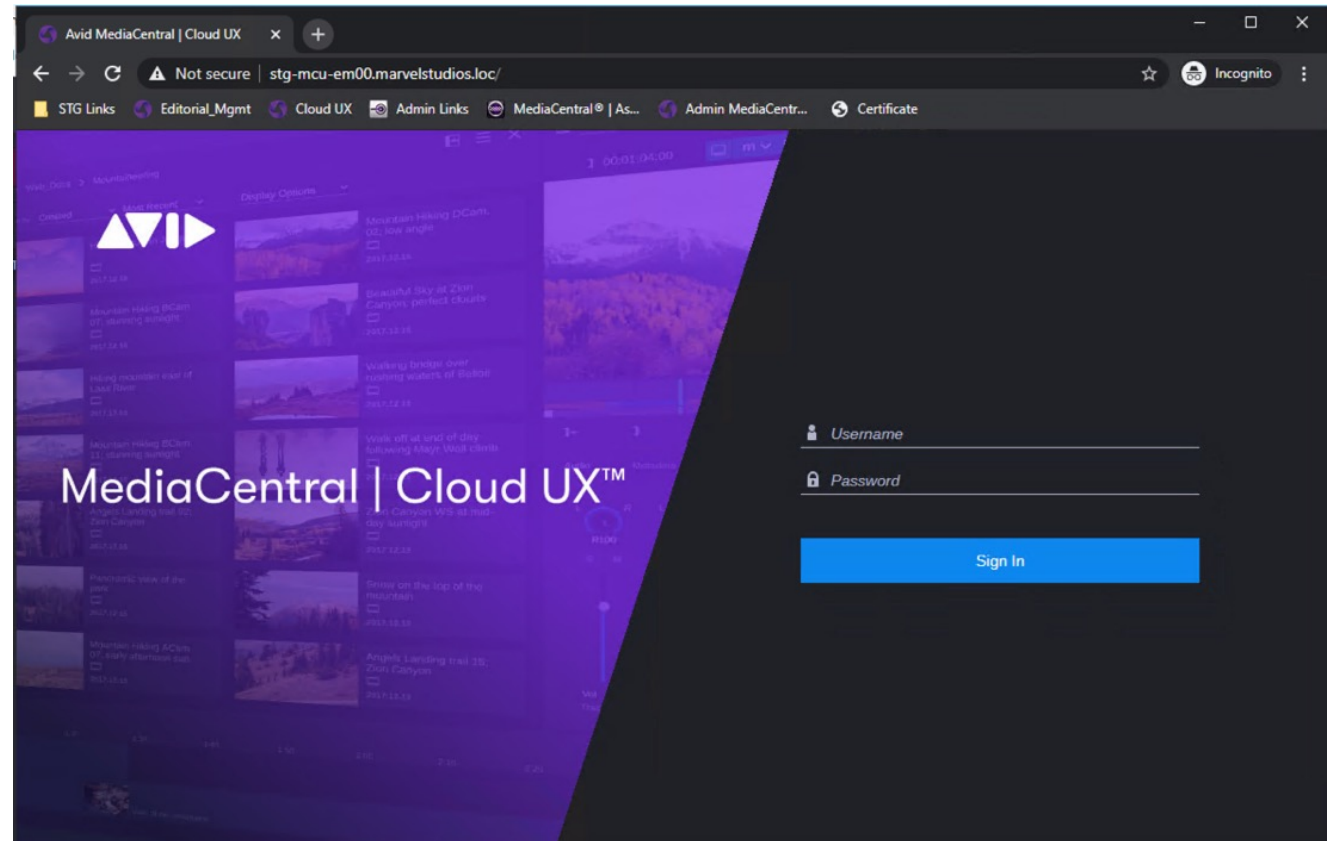


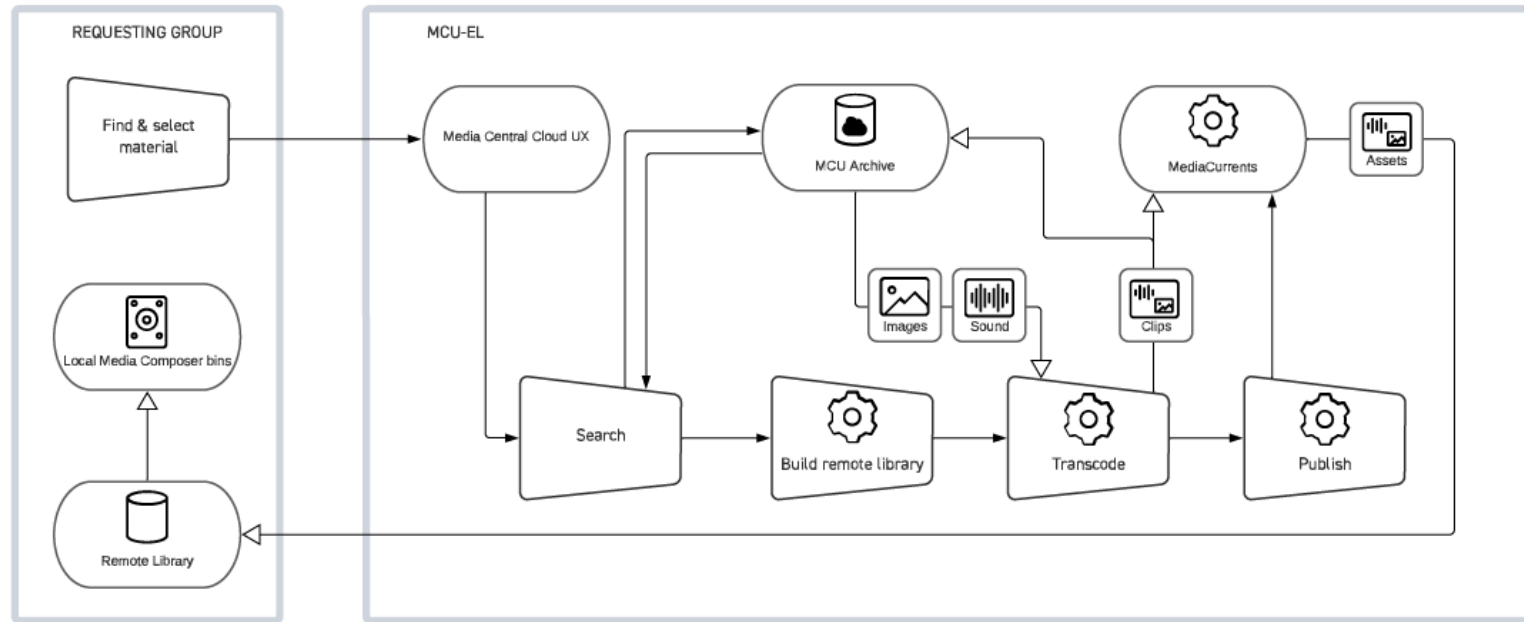
Shadi Almassizadeh
shadi.almassizadeh@disney.com



Before Scenario

- Historically, Avid designed and implemented broadcast driven Media Central solution. The editorial workflows were more news and sports centric instances revolving around Interplay and iNews with the new flagship Media Central suite focusing more on short form content.
- For long form and feature film-oriented workflows, those were usually orphaned content without any dependencies on sequential releases. There was never any demand to pull assets from previous movies or episodes.
- However, with the growing uptake of episodic content to satisfy the direct-to-consumer demand, the need for a library-oriented solution has been growing.

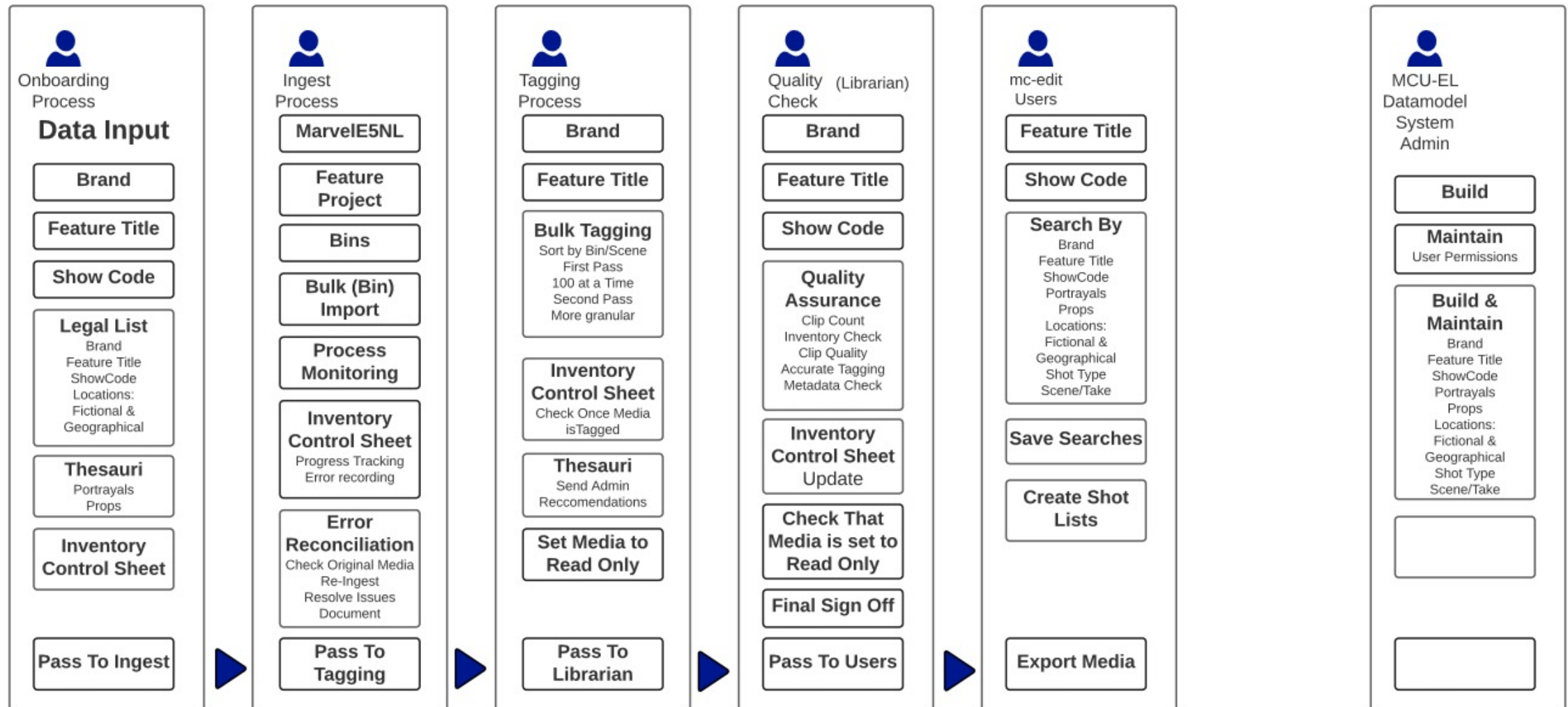




Enter Marvel Cinematic Universe with its ever-expandable realm of characters and parallel storylines. The need to create an editorial library to search, locate and use the massive library of assets has been paramount. Working with Avid, the Disney engineering teams built what we refer to today as MCU Editorial Library (MCU-EL).

Marvel Cinematic Universe – Editorial Library


Visual Workflow – Library to User





Lessons Learned and Next Steps

One the top key learnings was creating something for everyone is not an easy idea to sell. Often it was questioned if this is a Disney workflow problem or an industry problem. In the future, it would be good to evangelize the effort prior to starting to get more buy in from the industry.

1. Add customized dashboards for editors, engineers, and management, each featuring 3-4 key metrics most relevant for the specific audience.
 2. Consider linking the MCU-EL to the Marvel Studios Plates Lab for seamless integration with VFX workflows.
 3. Extend to other capabilities and assets, such as script resources or vendor applications for workflows like 2D or 3D modeling, re-rendering, and audio processing.
 4. Make the solution deployable on a hyperscale cloud. That will involve resolving issues around ingress and egress so that the deployment is both feasible and affordable, but it could also help with minimizing global latency and availability.
 5. Productization of the MCU-EL capability as a generic AVID service, with the goal for it to become a standard product extension of Media Central, broadly available to all.
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Marvel Studios Cinematic Universe Editorial Library



The *WALT DISNEY*
Studios



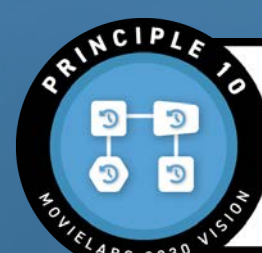
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Archives are deep libraries with access policies matching speed, availability and security to the economics of the cloud



Individual media elements are referenced, accessed, tracked and interrelated using a universal linking system



Workflows are designed around real-time iteration and feedback





SNEAK PEAK:

2023 Call for Case Studies

Focused on 3 Areas

1. Implementation of Common Security Architecture for Production (CSAP)
2. Implementations of the 'Ontology for Media Creation'
3. Implementations of Asset or Data interchange that demonstrate interoperability.

Submissions Open 1st June 2023!



THANK YOU

MovieLabs 2030 Vision
www.movielabs.com/2030Vision

