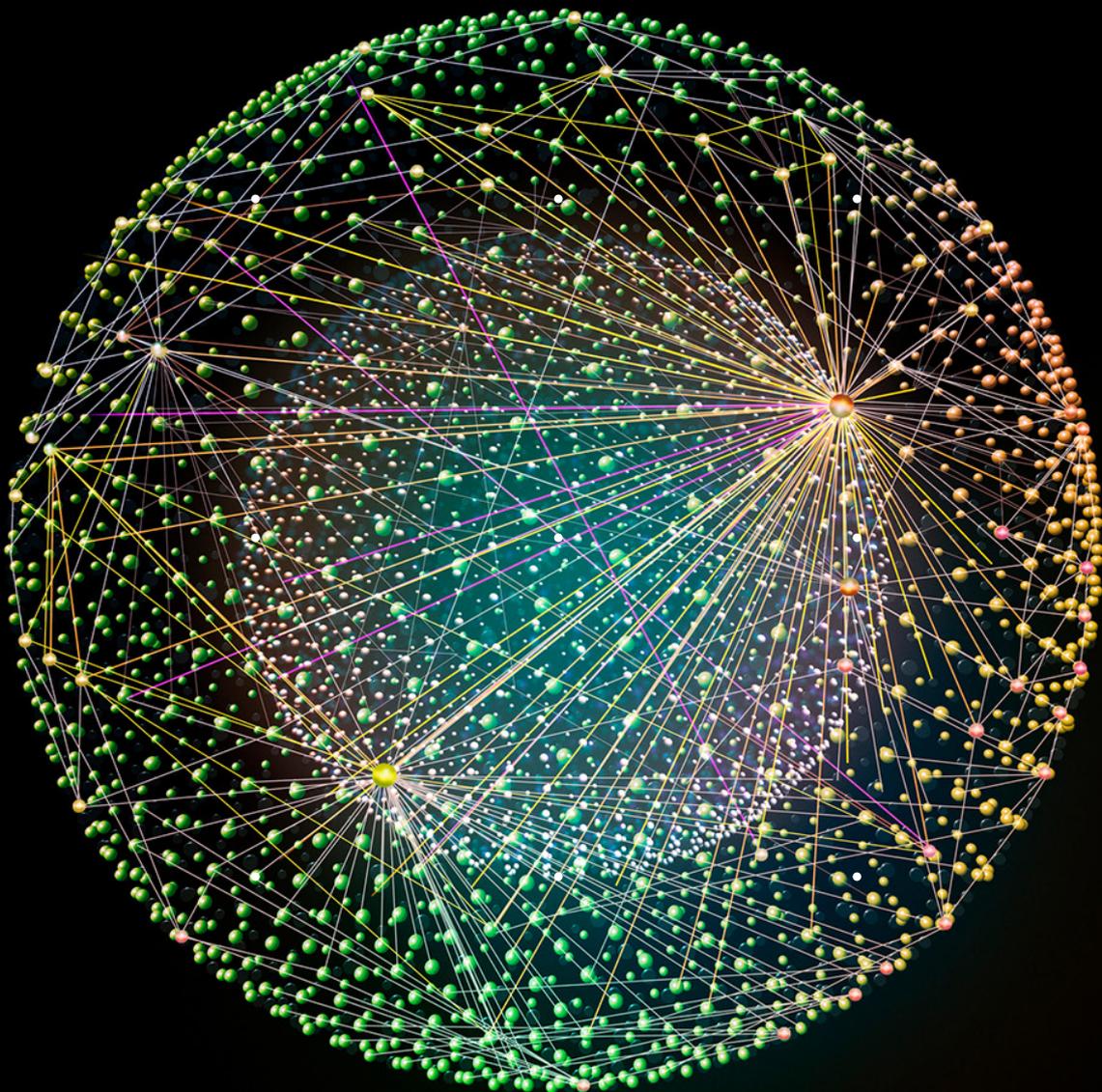




Channel 4 creates a Multi-Vendor Supply Chain Network on the Cloud with CLEAR[®].



Client Profile

Channel 4 is a free-to-air, commercially-funded public service broadcaster in the UK. It has the UK's biggest free streaming service, All 4, plus a network of 12 linear television channels. Its purpose is to create change through entertainment, and it does this by representing unheard voices, challenging with purpose, and reinventing entertainment. As a publisher-broadcaster, Channel 4 commissions UK content from the independent production sector and currently works with around 300 creative companies across the UK every year.

Business Context

Channel 4 is a "publisher-broadcaster," meaning that it commissions or acquires all its programming from companies independent of itself. It was the first UK broadcaster to do so on a significant scale. Channel 4, as part of its next-generation business architecture, chose to transition from a single vendor to a multi-vendor media supply chain. It needed a next-generation supply chain technology platform to orchestrate workflows and associated business processes across multiple suppliers and vendors for each asset.

PFT Solution

PFT leveraged CLEAR®, deployed and tailored it for a Multi-vendor Supply Chain Network to meet Channel 4's objective.

So, what is innovation? What does a Multi-vendor Supply Chain Network mean?

CLEAR® enables a unique multi-vendor supply chain network for Channel 4. CLEAR®

- Receives broadcast & VoD schedules from Channel 4 broadcast and rights systems
- Creates an advanced forecast for Channel 4 vendors for the content and associate material needed

CLEAR® cascades Channel 4's business priorities through Work Orders to Channel 4's vendors and drives the order of the work while tracking

- Task priority
- Job completion status
- Vendor SLAs
- Late deliveries
- Automated and secure content movement

All communication between CLEAR® and other vendors (Access Services, Postproduction, and Payout) is enabled through common interfaces, with underlying metadata and media framework securely over the Cloud.

By enabling an automated multi-vendor content supply chain, CLEAR® provides Channel 4 with the following:

- Complete title-based supply chain visibility across processes, suppliers, timelines, and media
- Channel 4 business priorities are cascaded to vendor priorities, dynamically driving on-time job completion and reduced turnaround times
- Various vendors make multiple and simultaneous operations possible for the same content

How did a Multi-vendor Supply Chain Network solve Channel 4's objectives?

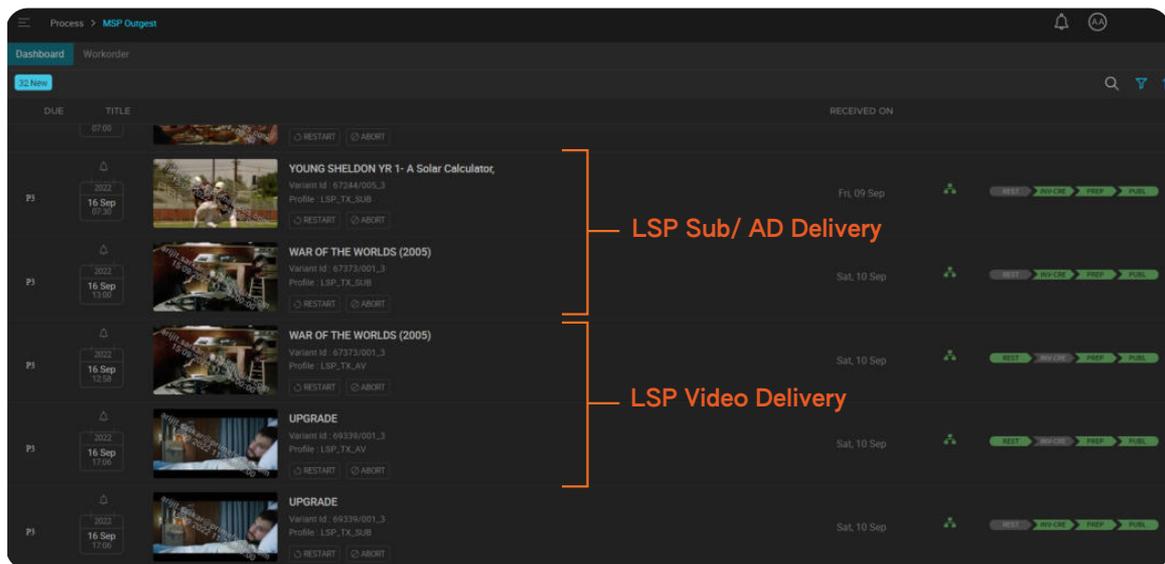
To start with, when Channel 4's decision from One supplier to a multi-vendor supply chain would not be possible without a technology platform like CLEAR®. This enables multiple vendor engagement in a single workflow for every asset. While these were performed across the vendors & sites, Channel 4 must stay in control. Besides migrating 7.5 PB of legacy content, Channel 4 also required a system that would bring automation in operations, scale dynamically to business needs and embrace all the most modern supply chain principles & standards. Here is how CLEAR® met these requirements:

1. Visibility

CLEAR® has enabled complete visibility into operations for Channel 4—visibility into operations across vendors who manage diverse processes. In addition, Channel 4

Media Management team now has complete transparency and visibility through CLEAR®'s real-time dashboards designed for operations visibility or departmental visibility.

Simple & Unified View of Content Deliveries Across Multiple Suppliers



2. Changing Business Priorities

One of the biggest challenges in multiple vendor engagement is that the changing priorities must cascade within the various vendors. CLEAR®'s advanced schedule feature helps manage this complexity by (a)

automating the assignment of the various tasks (b) changing its associated priority when the business priority changes, and (c) providing information about the change to all stakeholders.

3. Scalability

Built to support the streaming business requirements of All 4, where transcode & publishing loads change dynamically, CLEAR®

uses volumetric and schedule data to automatically scale the entire pipeline as required, including scaling out cloud services.

4. Catalog & Content Migration

When PFT started the project, our main objective was to build a modern, connected supply chain network for Channel 4 with zero disruption to Channel 4. We needed robust and accurate metadata to create an automated supply chain and to migrate

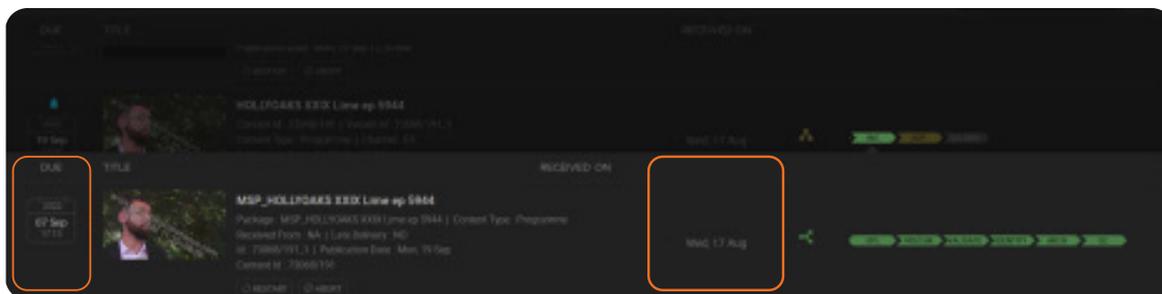
Channel 4's archive to the Cloud. Using CLEAR®, we migrated 7.5 petabytes of Channel 4's archive – comprising 700,000+ video assets and 450,000+ audio/subtitles files, and now hold approximately 1.65 million assets... and counting.

5. Modernization

Cloud Native Platform: CLEAR® is a cloud-native platform. Being Cloud native and purpose-built for hybrid deployment models, CLEAR® unlocks infinite possibilities around media processing. Though CLEAR®, in this case, was hosted on a public cloud, the content was stored in storage pools, including Cloud and on-prem infrastructure components for a given process. CLEAR® would then go to where the content is and operate these with adjacent resources on demand, including Auto QC, Cloud and on-prem transcode engines, and packaging solutions for OTT, to name a few. Deploying these workflows with CLEAR® has moved Channel 4 away from legacy processes and paved the way toward modernization.

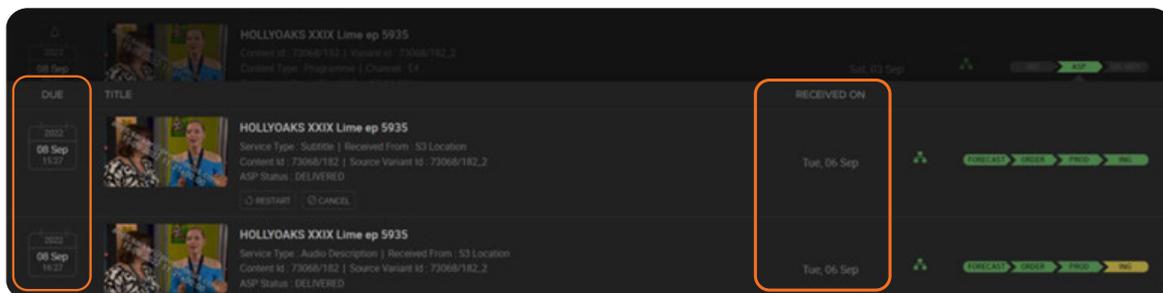
Right Toolkits: CLEAR® has multiple toolkits that enable modern and more efficient working methods for teams. Some tools include the CLEAR® cataloging tool for time code capture, content identification tool, and CLEAR® quality check tool. These enabled for Channel 4 operations to provide a seamless way of working so that the PFT operations team and Channel 4 duty desk can take informed actions.

Advanced Schedule: CLEAR®'s advanced schedule integration with Channel 4's broadcast scheduling & rights system enables forecasting and resource planning to support manual tasks such as QC and Access Services.



Advance Schedule Look Ahead Work Order for Content Ingest

The order was created automatically from Advance Schedule integration on 3rd May for content expected from the supplier on 20th May



Advance Schedule Look Ahead Work Order for Access Services

Orders were created automatically from Advance Schedule integration on 6th Sep

For access services due from supplier 8th Sep (subtitles) and 8th Sep (audio description)

Meaningful Insights: CLEAR®'s robust analytics engine provides granular insights to operations teams to identify process bottlenecks and take action. These reports are available for various business stakeholders to look at

- Infrastructure usage (storage, auto QC, transcode jobs)
- Vendor fulfillment jobs
- VoD and linear platform deliveries across categories and more

These reports are reviewed with Channel 4 regularly, and feedback is shared with respective vendors to ensure efficient workflows.

Rule-based Automation: CLEAR® provisions optimal business rules for smarter and more efficient storage management by introducing policy-based archival rules across various storage tiers governed by content category

Resilience, Business Continuity, and Disaster Recovery: CLEAR® provides a resilient disaster recovery backbone to ensure application and content availability for multi-vendor supply chain operations.

6. Next-generation Media Supply Chain

CLEAR® worked with Channel 4 to create an optimized next-generation supply chain that eliminates waste where possible. It combines the right tools, processes, frameworks, technology, and people.

A few focus areas include:

Content Acquisition: CLEAR® governs the framework for onboarding a content supplier. Once established, Channel 4's content suppliers, including commissioned studio distributors (Fox, Disney, Sony, etc.) and commercial and music aggregators (Clearcast, Peach, Adstream), send content to PFT on behalf of Channel 4. Content is sent via cloud buckets through notifications or CLEAR®'s UI. Each content type is configured with business rules to undergo further automation.

- **Supplier Trust Level:** Each supplier has been identified with a trust level based on which the content from the supplier would undergo business validation.
- **Validation and Quality Checks:** CLEAR® checks for viruses, provides content validations, and runs different levels of automatic quality check parameters.
- **Content Identification:** CLEAR® automates the content identification process altogether where possible. This is done using information delivered with the video – for example, UK DPP productions, commercials, or music videos. However, suppose the item arrives without sufficient details – for example, from an overseas distributor, CLEAR® adds the item to a work list for Channel 4's program managers, who preview the material and assign the correct Channel 4 ID, which links the record in CLEAR® with Channel 4's systems. Also, segmentation timecodes and audio track layouts are populated automatically by CLEAR® or a PFT Operator to ensure accurate automated AQC and loudness.

Content Exchange: CLEAR® orchestrates secure and automated content exchange with different vendors through common interfaces and frameworks. The advanced schedules help track the tasks and deliverables of each vendor inside CLEAR® as status is reported back. These are constantly visible on Channel 4. Working with Channel 4's other vendors for postproduction, access services, and playout, a "super trusted" ecosystem has been created to eliminate repeat processes. This means that items sent from PFT and new items from these vendors arriving at PFT are trusted to be good. Apart from a virus check and validation, including a checksum check, the item is not re-QCd, and the receiving party does not recheck the metadata.

Powering VOD: CLEAR®'s distribution module enables content delivery to Channel 4's OTT platform All 4 and multiple destinations, including Amazon Prime, YouTube, Virgin Media Ireland, Virgin Media UK, Sky On-Demand, SkyGo, Kantar Media, Sound Mouse, and Freewheel.

All deliveries are automated using separate trigger points for forecasting, transcoding, and actual delivery to use infra efficiently. Orders are triggered by Channel 4 system via API; CLEAR® restores content from the archive, performs clipping, stitching, if needed, transcodes, packages, and delivers. This applies to pre-onboarded destinations, including linear playout, other vendors, streaming services, or ad hoc, where a file or link is sent to a nominated recipient.

Rendition Rationalization is done across ten renditions to repurpose files needed for redelivery for other destinations within specific timelines.

7. Automation

With CLEAR®, Channel 4's operations are highly automated. The Channel 4 workflows are broken down into three phases:

Inbound process:

There are two ways to onboard a content provider. All the producers of commissioned content, for example, are onboarded by Channel 4, which creates logins in CLEAR® to allow upload via the CLEAR® user interface. For some studio distributors, such as US studios and commercial aggregators, a 'bespoke' onboard model is created by PFT using S3 buckets or Aspera endpoints as required. The content provider then uploads the content, and CLEAR® handles the rest automatically – from receiving content, performing virus checks, validating content, and archiving (both onsite and on the Cloud). CLEAR® is built to onboard new suppliers quickly and easily.

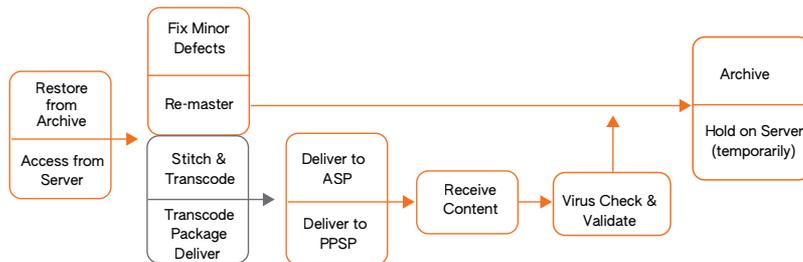
CLEAR® also helps automate manual tasks that would otherwise need to be managed by Channel 4:

- **Content Identification:** where automatic content identification is possible using information delivered with the video – for example, for UK DPP productions, commercials, or music videos - CLEAR® automates the process altogether. If the item arrives without sufficient information – for example, from an overseas distributor, CLEAR® adds the item to a work list for Channel 4's Program Managers, who preview the material and assign the correct Channel 4 ID, which links the record in CLEAR® with Channel 4's systems. As a further step, segmentation timecodes and audio track layouts are populated automatically by CLEAR® or a PFT Operator to ensure accurate automated AQC and loudness assessment.
- **Content QC:** Every item undergoes automation followed by a manual content QC to ensure the quality of the content meets Channel 4's standards. There is a range of profiles for both AQC and MQC depending on the content type, business rules, and occasional specific requests by Channel 4. The review process, status and progress updates, and outcomes are integrated with Channel 4's systems in real time.

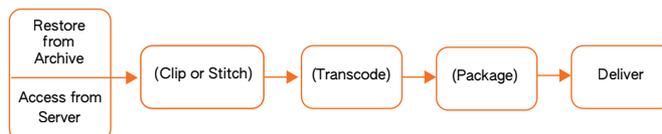
Inbound



Transform/Enrich/Collaborate



Outbound



Work orders are created by:
API calls from C4 or partners or UI inputs

Transform/Enrich/Collaborate:

Except for craft editing to create new versions or fix defects and the production of access services, the remainder of these workflows is automated. If a new editorial version is required, once CLEAR® has received an API call from Channel 4 systems, restoring, delivering, and later ingesting the new material with the correct ID and hierarchy is entirely

automatic. Working with Channel 4's other vendors for postproduction, access services, and playout, a "super trusted" ecosystem has been created to eliminate repeated processes. This means that items sent from PFT and new items from these vendors arriving at PFT are trusted to be good. Apart from a virus check and validation, including a checksum check, the item is not re-QCd, and the receiving party does not recheck the metadata.

Outbound:

The outbound transcode and delivery is entirely automated and completely hands-off. Upon receiving calls from Channel 4 or other vendors via API or user interface, CLEAR® restores content from the archive, performs clipping or stitching if needed, transcodes, packages, and delivers. This applies to pre-onboarded destinations, including linear playout, other vendors, streaming services, or ad hoc, where a file or link is sent to a nominated recipient. PFT also provides non-linear/streaming services for Channel 4 and its All 4 brand. CLEAR® integrates with Channel 4 systems and entirely automates the

transcoding, packaging, and delivery of high volumes of multiple renditions to the full range of streaming platforms, including All 4, Amazon Prime, YouTube, Virgin Media Ireland, Virgin Media UK, Sky On-Demand, SkyGo, Kantar Media, Sound Mouse, and Freewheel.

Automation is essential for Multi-Vendor Supply Chain Networks of this scope and scale because handling the volume of content, the number of tasks for each activity, and the frequent changes to deadlines are far too many to be manually possible. Therefore, automation is critical to managing all the orchestrations across the content supply chain.

“To manage a complex operational setup like ours and undertake this project during the pandemic was not easy. However, our suppliers have proved critical to our success in migrating to a multi-vendor supply chain, and CLEAR® is an integral part of this.”

Andy Bell

Chief Engineer, Channel 4

Client Outcome

The CLEAR® Multi-Vendor Supply Chain Network orchestrates the high-volume business process-related tasks for both the linear broadcast & streaming business requirements across multiple suppliers and vendors daily through hyper-automation. The result is a highly flexible, transformational, and modern supply chain that gives Channel 4 the agility to achieve its vision.

Today, CLEAR® integrates with Channel 4 and its content suppliers' systems and manages workflows across third-party vendors for access services, postproduction, and playout – supporting all of Channel 4's linear & streaming platforms. In addition, CLEAR® migrated 7.5 petabytes of Channel 4's archive – comprising 700,000+ video assets and 450,000+ audio/subtitles files and now manages more than 1.65 million media assets for Channel 4.

