



Optimizing the Content Supply Chain: What Manufacturing Can Teach the Broadcast Industry

By applying best practices and models used to optimize physical supply chains, broadcasters can more effectively manage their digital content operations.

Executive Summary

Faced with the increasing volume, variety and complexity of assets and metadata, as well as the need to reduce operational costs, broadcasters have long sought to manage their content supply chain as a factory. At the simplest level, media logistics involves taking in raw material at one end, processing it and producing finished assets at the other end. While in reality it isn't that simple, broadcasters can learn how to optimize their content supply chains by looking at and learning from manufacturing.

By creating standardized, repeatable and measurable processes, similar to the way a manufacturer manages the production of physical goods, broadcasters can optimize the way content is managed. We have identified best practices used in the manufacturing industry¹ and adapted these to manage digital content more effectively.

This white paper examines the parallels that exist in supply chains across industries and the challenges

faced by both physical and digital content supply chains. We then consider how disciplines used by manufacturers, such as the Supply Chain Operational Reference (SCOR) model, benchmarking and supply chain maturity assessments, can help broadcasters improve how they track content quality and optimize its creation.

The Content Factory

Figure 1 (next page) illustrates the concept of an industrialized content factory. The content factory relies on a centralized ingestion function, with standardized processes, to minimize the variation of incoming material. Assets are stored in a central repository or archive, using common asset numbering. Additionally, there is an export, packaging and distribution function that repurposes content for each of the different consumer-facing platforms. This is not purely a technology challenge, as it involves adopting a highly organized approach to managing metadata and assets, changing how people think about quality, and performing routine tasks in a better way.

Content Operations as a Factory

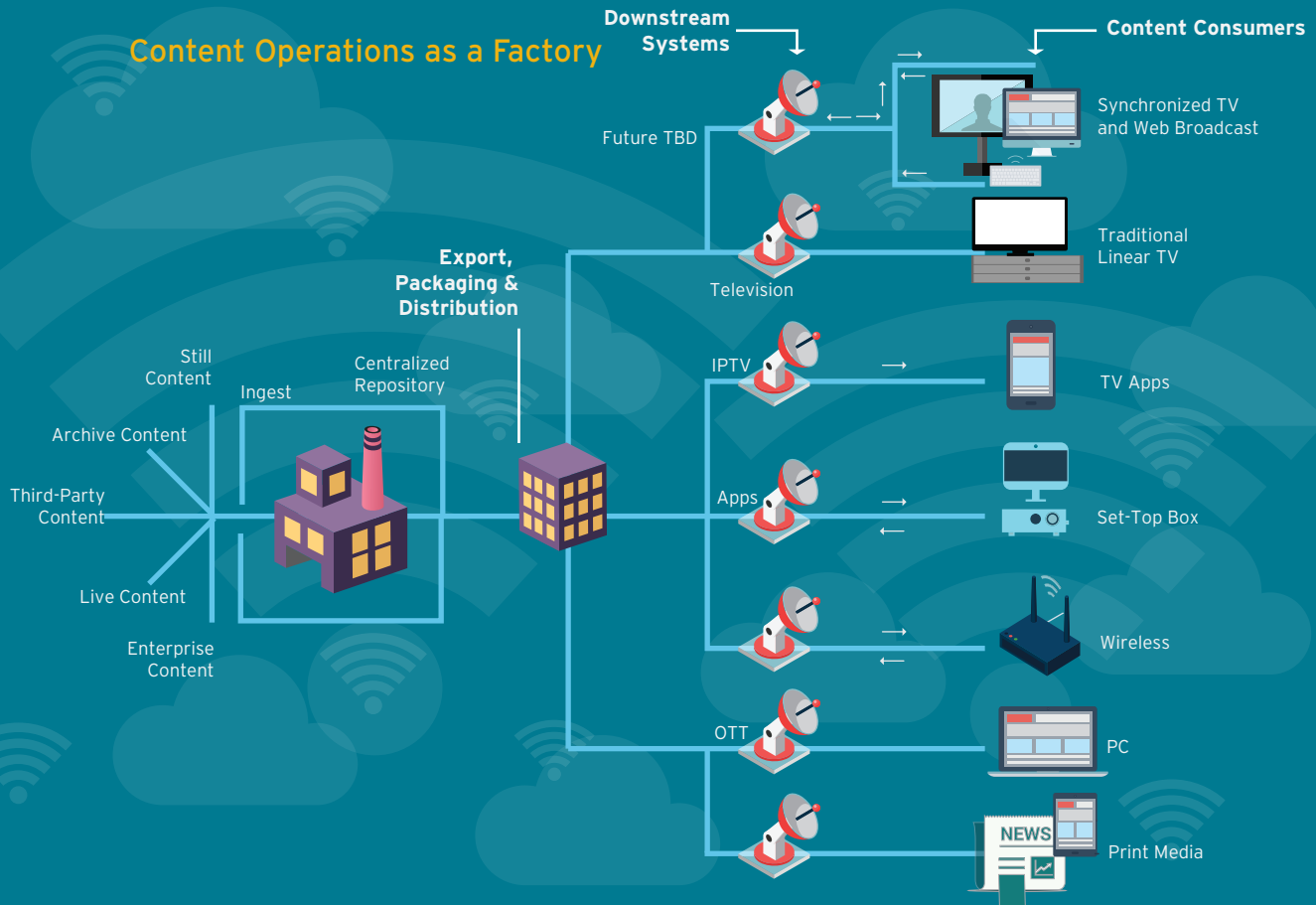


Figure 1

Content creation is not like a mass production process. At \$6 million per episode, for example, *Game of Thrones* demands kid-glove treatment to ensure that the video, audio, promotional material and metadata is of the highest quality. For this reason, it is important to take the value of the content into consideration when designing the supply chain processes.

Broadcasters often complain that the variety of content is so wide-ranging (from high-definition movies, to live sports, to promos and interstitial programming), that it is almost impossible to benchmark and continuously improve quality. A useful metric we have used to overcome this challenge is "processing time per content hour." This involves measuring the time, effort and data volume involved with processing the content, which enables the broadcaster to compare processes despite the wide variation of content types.

Physical Supply Chain Management: More than Shifting Boxes

Despite its recent challenges, Toyota became the envy of the manufacturing world in the 1980s with

its hyper-efficient, pull-based supply chain model based on lean manufacturing principles. The lean philosophy takes an end-to-end process view and sees the organization as a system. The overall aim of lean is to create an operation with lower costs, faster processes and motivated employees.

Following Toyota's lead, other companies that produce physical goods have focused on making their supply chains more agile, scalable, responsive to demand and globally synchronized. In the same way that broadcasters have been driven to change by service digitization, the physical supply chain has also been adapted to meet consumer demand for products that are bought and delivered in the most convenient way possible. The parallels between manufacturing and broadcast supply chains are illustrated in Figure 2 (next page).

Whether a company produces digital or physical goods, different entities play key roles across the supply chain, with important handoff points in the product's journey to the consumer.

For a clothing manufacturer and retailer, for instance, a garment can be produced by sourcing

Parallels Between Physical and Content Supply Chains

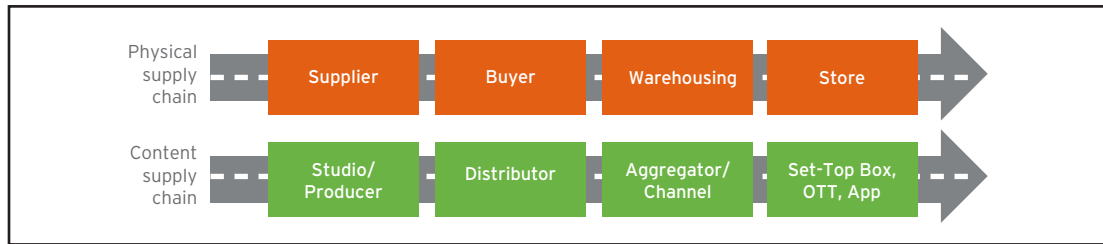


Figure 2

piece parts or finished goods locally or internationally. Once produced, the garment is sent to a distribution center and then to a retail outlet. A consumer can purchase the garment at a store or order it online for delivery at a designated place (home, store or another pickup point).

For a broadcaster, meanwhile, the value chain for a show like *The Big Bang Theory* starts with the producer (Chuck Lorre Productions) and moves to the distributor (Warner Brothers Television in the UK, for example), where it is acquired by a network (i.e., Channel 4). In *The Big Bang Theory*'s case, the content is shown on the E4 linear channel that may be carried on a variety of services, such as Sky, Freeview and Virgin Media, as well as on-demand across a range of devices via an app such as Channel 4's All 4 app.

Both types of supply chains need planning, monitoring and escalation of fulfillment if problems occur on the way to the consumer.

Overcoming Supply Chain Challenges Across Industries

Based on cross-industry research, we've identified several common challenges with supply chains that deliver manufactured goods or digital content (see Figure 3, next page). A key concern is the lack of end-to-end visibility and planning for capacity spikes, whether the company is Virgin Media or Walmart. The parallels become even more striking given the increasing push among physical retailers to deliver their goods via digital channels.

Some approaches that organizations are taking to optimize their physical supply chains include asset consolidation, supply chain analytics, an omnichannel strategy, improved supplier collaboration and the use of emerging technologies. For example, a European car manufacturer is adopting virtual reality techniques to develop a package of customer services covering vehicle purchasing, financing and servicing that are tailored for individuals and available on multiple digital platforms. Meanwhile, a global retailer is improving its

omnichannel capabilities by building a world-class global supply chain system to meet the growing customer expectation of "order anywhere using any device and receive anywhere."

No matter what the approach, a key to understanding the root causes of problems, identifying creative solutions and ultimately optimizing the supply chain is the use of operational metrics and diagnostic tools, such as the Supply Chain Council's SCOR model.²

The SCOR model evaluates existing operational metrics against the business objectives of the organization and the industry and provides a model for future KPIs. It can be used to analyze end-to-end processes, technology and organizational strengths and weaknesses. This analysis can be combined with a supply chain maturity assessment to highlight areas that are performing well and those that are under-performing.

For the retailer in the previous example, we used the SCOR model to target its business intelligence strategy. We also helped the car manufacturer develop a detailed supply chain process impact matrix using SCOR. The model was also used for a leading pharmaceuticals company in Europe to determine a future approach to managing its end-to-end supply chain.

In our experience, broadcasters do not use operational metrics enough, and when they do, they often do not measure the right things.

Benchmarking: 'The Show Must Go On'

Broadcasters can similarly benefit from a greater focus on operational metrics and benchmarking. However, in our experience, broadcasters do not use operational metrics enough, and when they do, they often do not measure the right things. For example, measuring the total number of assets produced in a month is a crude metric,

Top Challenges for Content and Physical Supply Chains

Challenges in Digital Content Supply Chains	Business Impact	Challenges in Physical Supply Chains
Consumer expectations to access any content on any device at any time.	Companies have adopted siloed systems and processes to meet consumer expectations, resulting in increased costs to meet growing consumer expectations.	Retail consumer expectations to have the same buying experience in different channels (in-store, online, etc.) at any time.
Large variation of video/audio file and metadata formats due to lack of widely adopted standards.	Increased effort is required (e.g., duplication, manual changes) to meet constantly evolving customer expectations.	Existing standards that may not meet the needs of changing business model/customer expectations.
Increasing complexity as more service providers become involved and there's an increased propensity to outsource key content processing tasks.	Companies are exposed to new risks (compliance with regulations, disruptions, business continuity, etc.) that need to be mitigated to avoid increased cost of fulfillment and to ensure continuous product availability.	Increasing complexity, as globalization has changed the way companies source materials, and manufacture and deliver end products to consumers.
Lack of visibility of end-to-end content: <ul style="list-style-type: none"> Content spotted too late. Inability to prioritize content properly. 	Companies are exposed to operational failures and reputational risks, resulting in loss of sales and/or low customer confidence.	Lack of visibility of end-to-end supply chain: <ul style="list-style-type: none"> Disruptions are caught too late, and supply chain struggles to react. Inability to prioritize and make informed decisions.
Lack of capacity planning for bursts of demand.	This can result in lost sales and/or low customer confidence, which impacts brand image.	Lack of manufacturing flexibility and capacity planning for bursts of demand.
Lack of industry-wide operational benchmarks and KPIs, which limits the ability to determine quality.	Companies struggle to determine quality levels and risk investing in technology and processes that do not add value, impacting costs of fulfillment.	Lack of know-how to adopt best practices within the industry and limited knowledge of KPIs on new trends within the supply chain (e.g., big data and analytics).
Service provider relationships based on throughput rather than outcome.	Businesses are unable to improve customer service and reduce fulfillment costs because they are unable to leverage supplier/service provider capabilities to meet customer expectations.	Supplier relationship limited to service provider rather than business partner.

Figure 3

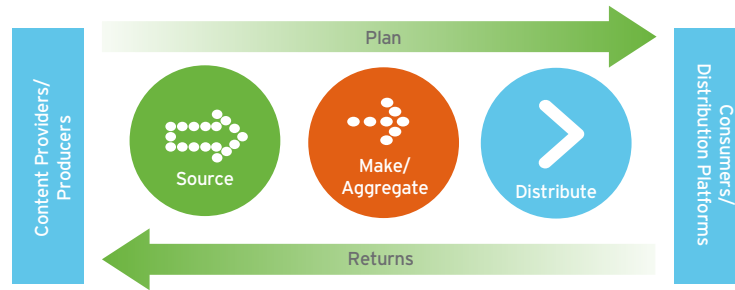
while measuring the cost of asset production is more revealing, as it takes into account quality control (QC) failures, rework and use of resources.

There are various reasons for broadcasters' historically weak approach to measurement, including the difficulty of collecting and analyzing data, a lack of standardized processes to measure consistently and a lack of senior management support for the activity. Creative workplaces are typically unstructured and look askance at an analytical approach to operational excellence. The industry's motto of "the show must go on"

informs the broadcast culture, often inspiring heroics rather than continuous operational improvement.

To help broadcasters improve their approach to metrics, we have adapted the SCOR model to work in the context of a content supply chain. We divide the supply chain into five stages (plan, source, make/ aggregate, distribute and returns). For a media and entertainment company, "returns" refers to the revenue and usage data that is generated after the content is consumed.

SCOR Model Applied to the Content Supply Chain



Source	Plan	Make/Aggregate	Distribute	Returns
<ul style="list-style-type: none"> Minimize variation of content to format, delivery method, associated metadata. Deliver in enough time to prepare content for distribution. Unique naming of assets on entry. Identify issues with content as early as possible through quality checks. Stock/inventory value (currency value). Number of QC check failures (num). 	<ul style="list-style-type: none"> Capacity planning. Resource planning and utilization. Ability to react quickly to changes in demand and priority. Continuous improvement. Forecast vs. actuals. Visibility of content end-to-end. Escalation of content in jeopardy. Onboarding new content providers. Third-party vendor management. Total number of employees working on content processing activities (num). Manual processing time per content hour. 	<ul style="list-style-type: none"> Minimize wasteful process (only make what is needed). Ability to expedite processes. Localization of content and integration with language suppliers. Minimize rejection of content after production processes. How much of archive is in rights? Compliance? Individual task time monitoring (e.g., asset retrieval time from archive). Value of paid storage space not utilized (currency value). 	<ul style="list-style-type: none"> Onboarding new distribution platforms. Minimize variation of distribution formats. Speed of fulfillment. Minimize rejections or late delivery. Identify and escalate/replace assets in jeopardy. Volume of assets delivered. Account management with distributors. Platform management: Hours/assets per platform, how to prioritize, service management. Number of rejections per distribution platform (num). Total number of orders fulfilled (num). Number of distribution deals completed on time (num). 	<ul style="list-style-type: none"> Associate revenue with acquisition and production costs. Revenue vs. cost. Ability to measure effectiveness of supply chain. Revenue per distribution platform. Revenue per content provider/deal. Percent revenue growth. Revenue vs. cost of goods sold.

Figure 4

Figure 4 depicts this model, along with suggested KPIs for each of the five areas involved in getting media from producers to the consumer. Additionally, here are examples of how the SCOR model can help media companies with their content supply chain:

Plan

Planning must involve an end-to-end view of the content supply chain. For example, if there's a risk of content being late to air, it is not sufficient to prioritize just the initial ingest process; it needs to be treated as a priority through the rest of the processes, as well.

Because end-to-end prioritization often involves several systems, an orchestration layer is required

to manage the allocation and order of jobs across the media asset management (MAM) ecosystem.

Broadcasters also need to consider capacity planning to manage the peaks and troughs in content volume. It is critical to build capacity into file-based workflows in order to avoid bottlenecks caused by constraints in equipment or resources. Parallel processing, orchestrated by the MAM, is one way of doing this. (For more information on the importance of supply chain planning, see our whitepaper "[2014 Supply Chain Planning Benchmark Study](#).")

Source

To optimize the efficiency of the end-to-end content supply chain, it is important to identify quality issues as early as possible and correct

Top Challenges in Content and Physical Supply Chains



Figure 5

any defects. For example, an incorrectly mapped audio track could either be corrected in-house by the content aggregator, or it may need to be sent back to the content provider.

Make/Aggregate

As part of the make/aggregate component of the content supply chain, it is important to consider the relationship between quality, cost and speed when analyzing processes. A high-definition premier movie may justify having a full manual eyeball check, while lower value content may need only spot checks.

Common areas where content processing bottlenecks arise in broadcast are numerous and varied (e.g., preparing Dolby E or Harding tests for flashing video). The ability to measure content processing time through these steps is critical to identifying and implementing improvements.

Distribute

Metrics around delivering volumes of content at an appropriate quality need to be tracked as part of the supply chain. Common KPIs include the number of orders fulfilled and the number of rejections per platform. However, it is important to link this data with the value of the content; missing delivery of the *Doctor Who* Christmas episode may have more consequences for the

broadcaster than failing to deliver an episode of *Storage Wars*.

Return

In order to measure the overall effectiveness of the content supply chain, it is important to compare the cost of production, acquisition and/or processing with the revenue generated by the content. Given the high number of content distribution platforms, obtaining overall revenue can be a challenge for most media companies. Having a unique asset ID (such as EIDR³) that handles the round-trip journey for content that comes back from the distribution platforms is one way to help speed comparisons between revenue and cost of goods sold.

Assessing the Maturity of Your Content Supply Chain

Broadcasters need to approach content supply chain improvements in a sequential manner, as there are no shortcuts to attaining or sustaining mature capabilities; it all starts with evaluating existing capabilities. Our Content Supply Chain Maturity Assessment (see Figure 5) considers 14 criteria across content operations that we believe are critical to running an effective supply chain, based on our cumulative years of experience in this area.

Content Supply Chain Maturity Model Levels

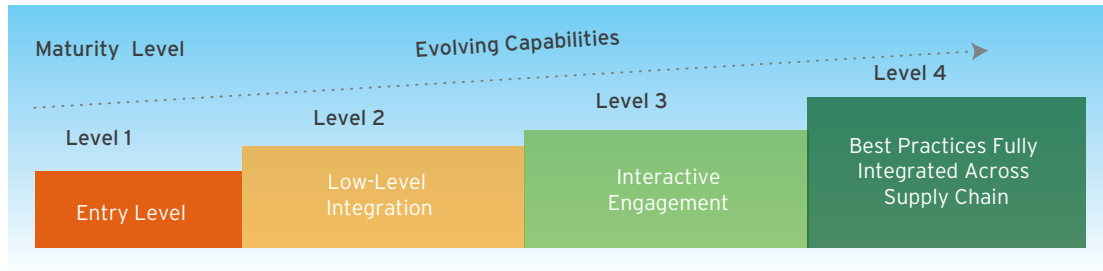


Figure 6

We map the characteristics of each criterion against four levels of maturity: entry, low-level integration, interactive engagement and best practice (see Figure 6).

Taking metadata management and metadata health as an example, the following characteristics would be seen at each maturity level:

- **Entry level:** Metadata is largely manually entered into spreadsheets as part of tracking content through the supply chain. Limited operational data is available, with no analytics capabilities. The metadata model is managed on an ad hoc basis with little consideration for the impact on upstream or downstream processes.
- **Low-level integration:** A common asset numbering system exists, together with a basic metadata strategy. The data is fragmented, with limited extraction and analysis capabilities.
- **Interactive engagement:** Taxonomy and ontology of the metadata model is applied and managed by a central curator role. One-off analysis of operational data is possible, with some ability to drill down to more detailed levels. Useful metadata is not always available across the content supply chain.
- **Best practice:** Metadata is exchanged electronically across the supply chain, with very little human interaction. There is a rich, consistent set of metadata, with near real-time visibility of data across the business. The business supports flexible extraction and analysis of operational data across the supply chain.

Broadcasters may have greater maturity in some areas than others, but the aim of the model is to provide recommendations to improve the overall effectiveness of the entire supply chain.

In our experience, most broadcasters currently fall between levels 2 and 3 on the maturity scale, although criteria such as agility, supply chain improvement focus within the business, and information management are consistently low across the industry.

As with physical supply chain initiatives, the first step toward making improvements is increasing awareness of areas of weakness and understanding what good processes look like.

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Looking Forward

Best practices commonly used by manufacturers of physical goods, such as benchmarking key operational metrics and continuous operational improvement, can be adapted for broadcasters to optimize the content supply chain. The design of the content supply chain needs to consider the relative value of the content being managed. KPIs such as processing time per content hour allow broadcasters to measure the supply chain despite high levels of variation.

Broadcasters can use diagnostic tools such as the SCOR model and our Content Supply Chain Maturity Assessment tool to help identify areas for improvement and provide new KPIs to optimize broadcast content operations.

Footnotes

- ¹ "Orchestrating a Supply Chain Competitive Edge," Cognizant Technology Solutions, January 2015, <http://www.cognizant.com/InsightsWhitepapers/orchestrating-a-supply-chain-competitive-edge-codex1256.pdf>.
- ² For more information on SCOR, see the APICS Supply Chain Council website, <http://www.apics.org/sites/apics-supply-chain-council/frameworks/scor>.
- ³ The Entertainment Identifier Registry Association (EIDR) has established a universal unique identifier system for movie and television assets. For more information, see the EIDR website, <http://eidr.org/about-us/>.

About the Author

Matthew Eaton is Director of Consulting within Cognizant's Information, Media and Entertainment business unit. Based in London, he has worked in the broadcast industry for the past 20 years as a management consultant and operational lead, managing technical solutions delivery teams and providing a bridge between operations and technology. He has worked with major media companies around the world, helping them improve their content supply chains and launch new products. A former head of VOD operations and planning at Virgin Media, Matthew brings a pragmatic approach to designing and rolling out digital solutions for broadcasters based on an engineer's understanding of the possible, combined with an appreciation for the commercial imperative. Most recently, he worked with clients to create strategic plans for IP operations and playout, make the right technology decisions for managing content and improve operational efficiency through process redesign. Matthew holds an international Executive M.B.A. from Ashridge Business School. He can be reached at Matthew.Eaton@cognizant.com.

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