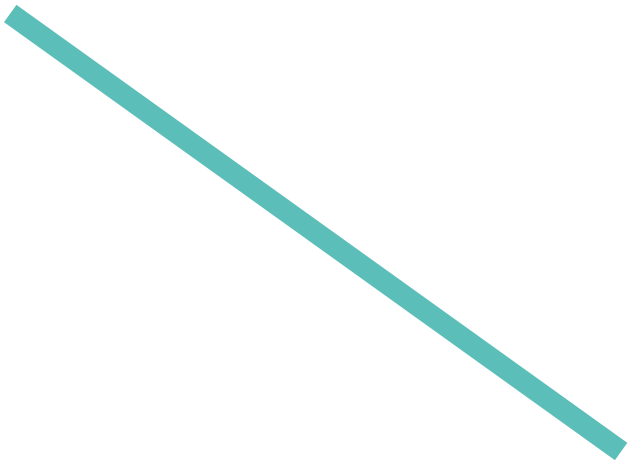
BROADCAST
THE BRIDGE
Connecting IT to Broadcast

Cloud Workflow Intelligent Optimization



Essential Guide

EG

ESSENTIAL GUIDES

Introduction

By Tony Orme, Editor at The Broadcast Bridge

Optimization gained from transitioning to the cloud isn't just about saving money, it also embraces improving reliability, enhancing agility and responsiveness, and providing better visibility into overall operations.

The processing power, storage availability and network resilience that modern cloud systems offer now meets the demands of broadcasters. Furthermore, the responsiveness and speed with which cloud systems can scale is opening untold opportunities.

Transitioning cloud systems into existing infrastructures workflow-by-workflow is by far the safest way to achieve integration. This not only allows broadcasters to take advantage of the scalable and flexible systems that cloud offers, but also allows them to look at their existing working practices, many of which may now be obsolete. The natural expansion of a broadcast facility over a twenty- or thirty-year lifetime, often sees processes and workarounds that are still in existence, but few can remember why. By having the opportunity to analyze workflows, broadcasters can build much more efficient systems and remove many of the antiquated systems of the past.

Cloud isn't just about moving static workflows from the existing infrastructures into datacenters. Instead, broadcasters must look at the areas of their workflows that can benefit from scalability. If a process is not being used, then why have it operational and using valuable resource? Thinking in the agile and dynamic mindset may be a leap of faith for many, but it's a prerequisite to making cloud integration successful.

It's fair to say that a public cloud will have more resource than we would ever need but understanding how processes operate on servers is another area where optimization can help provide massive gains. FTP, for example, will use much more network I/O than transcoding, so prioritizing I/O access is paramount. Not only does this provide better optimization for the server the FTP process is running on, but the benefits are felt all the way through the workflow as other processes can complete their tasks faster and with less resource demand.

Intelligent optimization is a lesson in data analytics. The amount of monitoring data available in cloud systems is breath taking and can be put to great use. Not only does this allow broadcasters to spin up and spin down resource as it is needed, but pinch points can be easily detected highlighting areas where workflow speeds could be improved. The response times with which cloud systems can achieve allows broadcasters to dynamically allocate workflows when they are needed, instead of leaving them running aimlessly consuming expensive resource.

Achieving dynamic and scalable mindsets through the adoption of agile working practices is critical to improving workflows. There is no place for storing things in case they will come in useful one day as this removes flexibility and creates waste. Workflows should only be created when needed and then rapidly deleted when not.

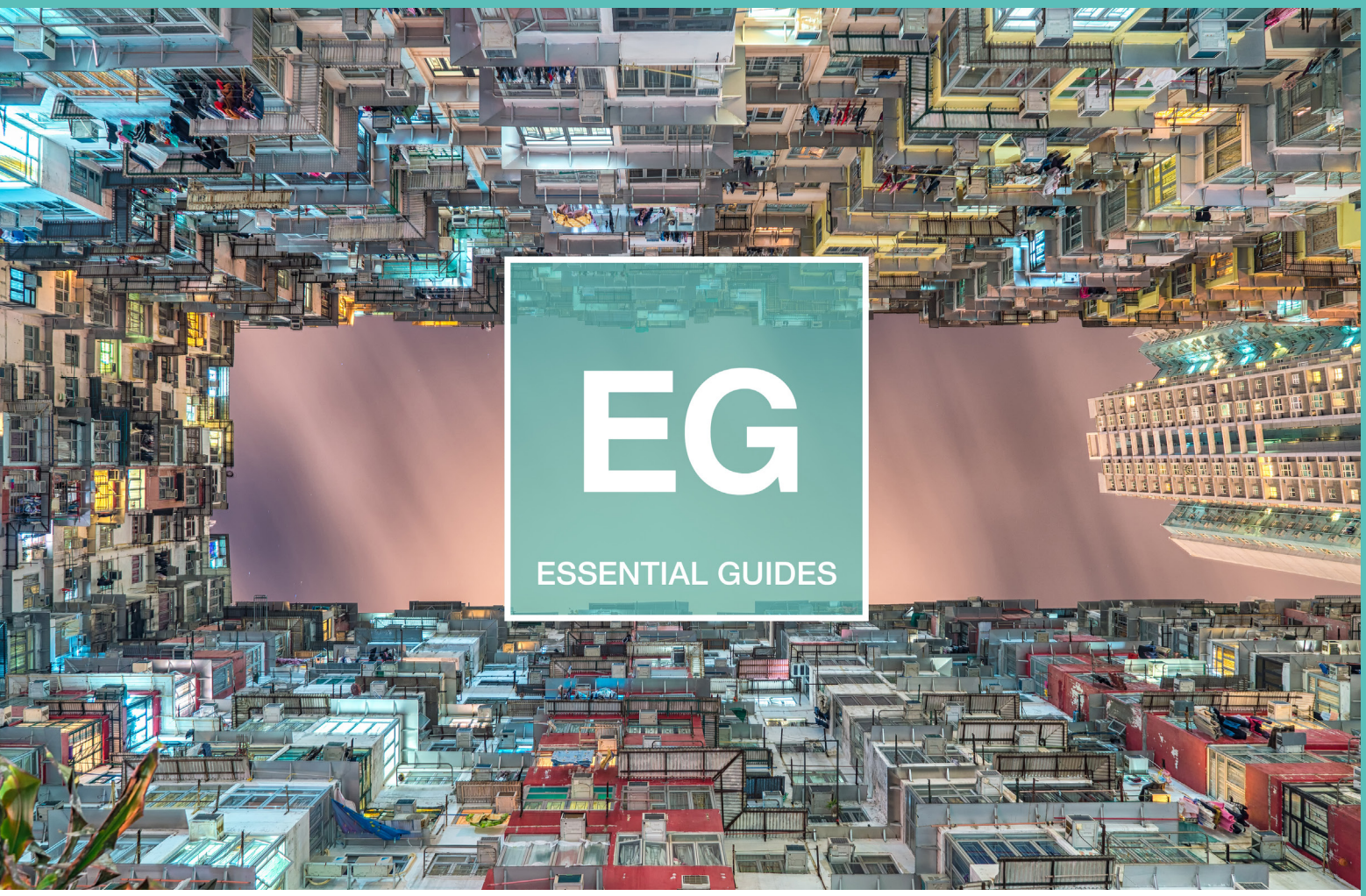
An often-unseen benefit for broadcasters transitioning to cloud operations is that specific jobs can be costed. All the data needed to understand the resource cost as well as which workflows will be needed is readily available, allowing broadcasters to quickly provide unit costs before a production is brought into life.

Tony Orme.

Transitioning to the cloud is a massive undertaking but working with industry specialists who have already achieved integration will help deliver a safe, flexible and reliable operation.

Tony Orme
Editor, The Broadcast Bridge

Cloud Workflow Intelligent Optimization



By Tony Orme, Editor at The Broadcast Bridge

Cloud systems benefit from being highly scalable and flexible as entire infrastructures can be spun up on demand to respond to peak demand without having to over provision or over engineer a design. The need to build "just in case" static systems where expensive resource sits around doing nothing for weeks or even months on end has been relegated to the history books.

Key to building optimized workflows is identifying where efficiencies can be improved through managing effort and identifying repetitive and well-defined tasks that can be automated. Cloud computing not only provides these tasks but through the interconnectedness of the virtualized ecosystem is able to determine where the efficiencies can be made and how.

Static systems have been relegated to the history books as they are built for the peak-demand model. That is, the highest demand possible on a system must be known in advance of its design. This was easy to cater for in the days of relatively slow-moving broadcast technology.

However, as technology has advanced beyond all comprehension and new formats and business models have been introduced, the requirement for the fast-changing infrastructures has become a necessity due to the rapidly advancing user requirements for Direct to Home (D2C) and streaming.

Enabling Technologies

IP is an enabling technology for broadcasters as it allows them to flex the power and flexibility of COTS and cloud infrastructures. Although they may still rely on physical hardware components such as servers and network switches, they also enable a massively flexible software approach to system design.

If public cloud systems are used, broadcasters can concern themselves less with hardware resource management and procurement and focus more on building flexible and scalable workflows through software design. The combination of software and software controllable systems provides the ultimate in flexibility and scalability for workflow development.

It's worth taking a step back and thinking about what we really mean by scalability and flexibility. Scalability is the power that enables us to increase and decrease the capacity of a system. Not only is this achievable through virtualization and cloud infrastructures, but also through network routing with software defined networks.

Improved Supply Chains

Most hardware components used in data centers are readily available from industry standard providers. Admittedly, the type of servers and network switches used for broadcasting won't be available in a high street store, but they will be available from the many standard providers throughout the world. Furthermore, these suppliers and manufacturers are providing equipment for much larger industries than broadcasting, consequently, equipment is much easier to procure than traditional broadcast gear.

IT industry vendors also provide many different service-level-agreement warranties that give broadcasters the peace of mind needed when running a 24/7 facility. Most industry vendors have representatives across all the continents and can provide response and repair times from hours to days or weeks, all depending on the type of service the broadcaster requires.

Few broadcasters have the opportunity to build a brand-new green field site. Instead, they must integrate the new datacenter and existing broadcast infrastructure together, even when most of the facility is live and on-air. Datacenters can be built to meet the requirements of workflows allowing broadcasters to transition safely and methodically, resulting in a low risk integration as the system expands. In the IP world, there doesn't have to be a single change-over event. Cloud systems can be brought online and accurately monitored to meet the needs of the service.

Complexity Choice

Public cloud systems further expand on the integration theme as they will have more capacity than we would probably ever need. A solution can be as simple as a single server or as complex as a highly integrated and fully scalable system. But as integration starts, the requirement will probably be somewhere within the middle of these extremes.

Virtualization makes the cloud possible, whether public or private. It not only provides resilience through distributed server processing, but also delivers scalability, that is, the ability to match user demand, quickly and efficiently.

Scalability works because it takes advantage of the redundant and unused resource in a server or cluster of servers. A transcoding process is generally CPU and memory resource intensive. Anybody looking at even the most basic CPU and memory usage software will see virtually all the CPUs jump to 100% during a transcode. But running a similar test on a file transfer function such as FTP, will see the CPU and memory resource stay low but the I/O usage on the network card go through the roof.

Advanced Monitoring For Optimization

Virtualization allows us to monitor processes individually so we can allocate them to the most appropriate server clusters. Public cloud providers allow broadcasters to provision differing resources to servers so a build-your-own philosophy can be adopted.

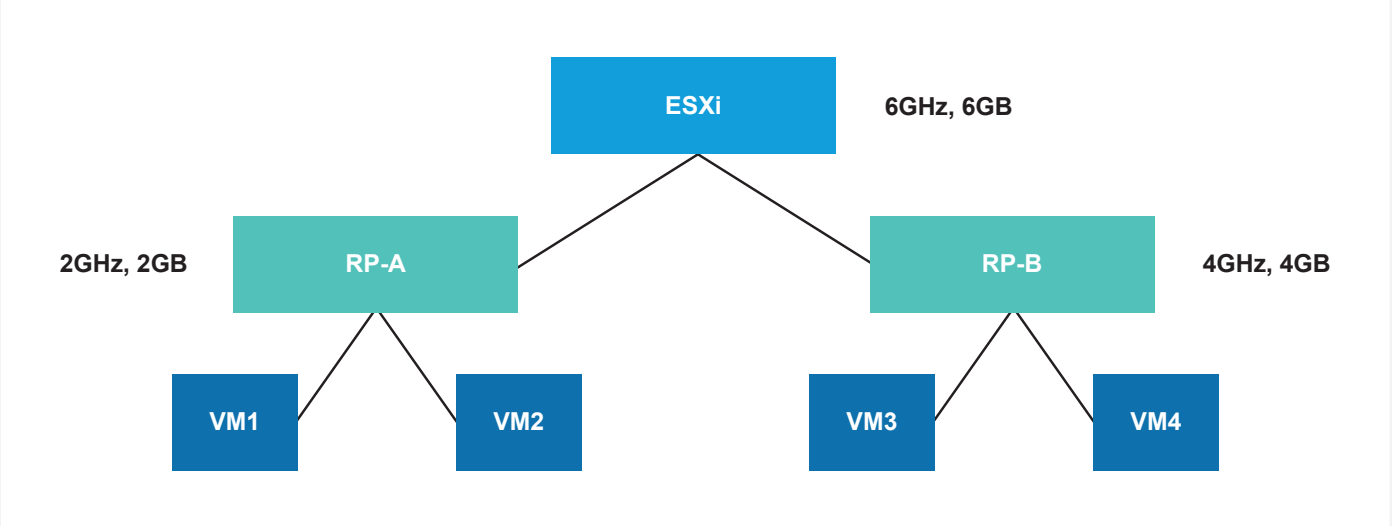


Fig 1 – A virtualized environment can allocate different resource to different VMs so they can be fine-tuned to meet the needs of specific services. In this example, RP-B has more CPU power and memory than RP-A allowing the connected VM's to be used for a CPU intensive task such as transcoding.

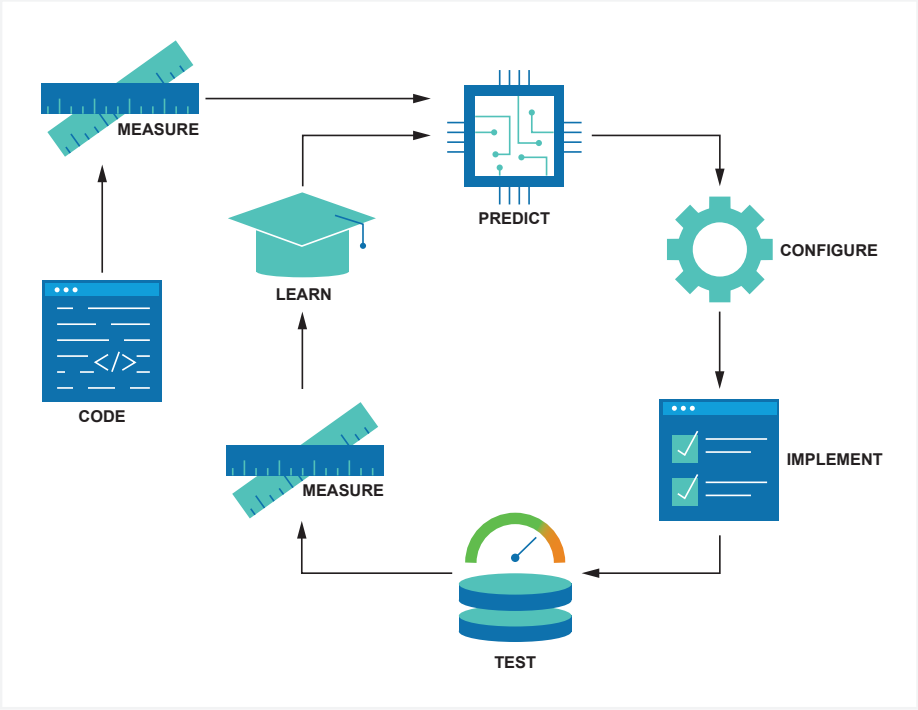


Fig 2 – The cyclical nature of agile software development leads to a constant review of the system resulting in highly efficient and well optimized workflows.

There's little point in allocating a server with 100 CPUs and 200 threads to a file transfer program, but this is exactly what we want to do for the transcoder, or any other video intensive processing.

To truly see the benefits of private and public cloud, engineers building broadcast workflows and infrastructures must shift their mindset from one of static infrastructures to that of dynamic and scalable systems. Engineers often have a room of "just in case" boxes and hardware that they can spring into action should the need arise (if it ever does). Equipment that has been decommissioned or may "come in useful" one day is locked away resulting in a "cannot throw away" mindset. Cloud computing is the opposite mindset to this. Metaphorically, we're throwing away the room of equipment that "might come in useful" one day because with cloud, we can build anything we need when we need it.

Delete and throw-away is the mantra of cloud. We do not physically throw away the hardware, but we do delete the virtual machines when not needed. Microservices take this to an extreme with their functions lying dormant as a software image, only when they are needed are they loaded into program memory and executed, and then deleted after use. Instead of physical boxes, we now have licensing keys.

New Mindsets Improve Workflows

Adopting the dynamic and scalable mindset is key to integrating and operating private and public cloud systems. There is literally no place for storing things in case they will come in useful one day, because doing so removes flexibility and creates waste. The agile software mindset relies on regularly deploying code, often in two-week cycles, so that should any bugs arise, they will be relatively minor and easy to either fix or roll back the software. Furthermore, the agile software mindset creates a culture where new functionality is continuously delivered without requiring hardware upgrade cycle.

Broadcasters have been moving to software for years and have often relied on monolithic programs probably without even realizing it. This is risky as operating-system version incompatibilities and hardware inaccuracies conspire against software developers looking to build generic software. With all the different versions of hardware available under the x86 umbrella, it proved incredibly difficult for vendors to deliver consistent code across many server manufacturer devices. The regular deployment of smaller flexible software services leads to incredibly stable workflows.

Playout systems regularly operate on servers and upgrading the software has traditionally been a complex and risky task. Even with backup systems, the number of single points of failure in single server solutions is vast and problematic. However, code running on virtualized servers, and hence cloud systems, is more consistent in both hardware and the intricacies of the operating system. It's simply much easier to test and validate the code as there are fewer virtualization variations. The code delivering the virtualized environment is much better contained and predictable.

Analytical Data

Another feature available in cloud systems is monitoring and metrics. Agile developers build massive amounts of analytics into their code to help with debugging and understanding the dynamics and interactions of the whole system. Modern code development relies on building smaller and more manageable programs that interact together through the exchange of control and notification messages. As each program works in isolation, understanding the code and message status is critical when scaling and interacting with other programs.

APIs provide this method of message interaction as well as a convenient access point to the data and control of the programs in general. A well defined and documented set of interfaces delivers a convenient gateway for developers integrating the services into their workflows. Although APIs develop over time and have features added to them, they do so by maintaining rigorous backwards compatibility. If the vendor releases a new API then any additions will not affect the integrators solution.

Vendors providing APIs can rigorously test them in well controlled environments so that any inconsistencies are easily detected before deployment. The API philosophy also prevents integrators from accessing the process in a method that is inconsistent with its reliable operation. And even if they achieve this, the vendor developers will have a mass of analytical data that logs the access to the API leading to a rapid fix and new deployment.

Services running in virtualized environments cannot assume that the programs they are communicating with are on the same server, or even the same datacenter. This becomes even more important when we start mixing workflows together that reside on public and private cloud systems. If a broadcaster's private cloud workflow needs to scale, then they should allow themselves the option of scaling to the public cloud.

Developers also need to understand where any bottlenecks are occurring within their solutions. One consequence of cloud systems is that we are limited to the amount of control we have over individual servers, and paradoxically, this is one of virtualizations greatest strengths. To be able to effectively manage and operate any system, we must be able to monitor it, and this is exactly what agile development philosophy has inadvertently delivered for us.

Long Term Data Availability

The log files and analytical data gathered by developers monitor everything from key presses on portals to the number of processes running and the resource they are consuming. All this data is logged and primarily used for diagnostics but is also available through tactical dashboards and computer files. IT have been using this type of data for as long as we've had virtualization to maintain the reliability and performance of their systems.

Using metadata broadcasters can see how their workflows are performing. Bottlenecks, over capacity, and under capacity can be easily spotted and rectified. Processes that are not being used can be deleted, often automatically using scalable control systems, and if a workflow is looking under strain, then new resource can be allocated to it to relieve its workload and increase the throughput.

Integrating workflows slowly into cloud systems provides broadcasters with the opportunity to identify existing workflows that are no longer productive or needed. Over a period of many years, broadcasters often bolt on systems and processes to provide new formats or fix specific user requirements. As the systems improve and evolve, old processes are forgotten but maintain their existence as nobody can quite remember what they do and are fearful of switching them off. However, as these processes require costed resource the opportunity to question their relevance is clear.

Costing Each Job

Extrapolating this thought process allows costing to be applied on a job-by-job basis. The availability of metrics provides enough information to show how long a job running through the workflow took, the processes it went through and the resource it used. Evaluating its actual cost just becomes a method of joining the dots in the analytical metric files and cloud service costings. Even if the broadcasters cloud service is on-prem then they can calculate the working costs of the processes running in their datacenter.

Workflow metrics become an analysts dream as the abundant availability of metadata empowers them to understand exactly what is going on within their systems and how. Optimization isn't just about saving money it also embraces improving reliability, enhancing agility and responsiveness, and providing better visibility into overall operations.

Transitioning to cloud not only reduces risks for broadcasters but allows them to take a deep look at their existing infrastructures and optimize efficiencies. This isn't just about saving money but also by reducing risk and the number of processes involved in workflows to help spread them over multiple sites.

The Sponsors Perspective

Directing The Supertanker To The Cloud In Micro-steps

By Geoff Stedman – Chief Marketing Officer, SDVI.

Sky directors of technology and content processing assess the challenges and benefits of evolving media supply chains from traditional on-premise to the cloud.

Anyone that is seriously considering moving to a virtual supply chain quickly realises that the transition doesn't happen overnight. The operational and financial benefits in terms of the agility and efficiency of the organization might be well understood but every broadcaster will take a different path to get there. It also takes courage to talk about the challenges of turning the super-tanker around and about the lessons learned along the way.

Europe's leading pay-TV broadcaster Sky began exploring its transition to cloud before owner News Corp (via 21st Century Fox) sold its controlling stake to Comcast. We sat down with Sky directors of technology and content platforms to talk about their journey to cloud-based media supply chains.

Supported by

"We started thinking about cloud long before Covid," explains Darren Long, Group Director of Content Processing at Sky. "We weighed up the cost of renewing our aging on-prem equipment or going to cloud and there was only one answer. What's more, moving to the cloud should lead onto other opportunities.

"We started where every large organization that has on-prem kit starts. We had sunk costs and a large operating unit, and it took an inordinate amount of time to look at some fundamentals."

There were big ticket questions for Sky: how much would a move to cloud cost against any long-term benefits? How would the organizational structure be reconfigured? How would operational teams adapt? Was Sky even ready to begin the transition?

"When we looked at all of these we kept freezing as large organizations tend to do," Long says. "There was no button we could switch. It was a long journey involving a lot of naval gazing to understand where we needed to go and to ensure everyone was confident in that process."

In October 2020, Dave Travis joined to spearhead the strategy. A highly experienced broadcast engineer, most recently as Red Bee Media's Chief Product and Technical Officer, Travis arrived as Sky's Group Director of Content Technology and Platform.

"Hindsight is a wonderful thing but a lot of people try and boil the ocean with this," Travis says. "People talk flippantly around agile and flexible methodologies but that disguises considerable complexity when it comes to putting cloud into practice."

He warns, "If you think with a monolithic software and on-prem hardware stack mentality you will be unsuccessful. You need to be thinking more about Lego blocks that you can move around."

For Sky, this required a business mindset as much as a technical approach.

"I got my fingers burnt with this," admits Long. "We had over 460 on-prem systems that were fundamentally processing content and we tried to phase out all of those in one hit into a hybrid infrastructure. We realised pretty quickly that that was too great a mountain to climb.

"I would warn other CTOs that they need to be very careful to ensure they don't go too hard too quickly."

Sky revised its strategy and began breaking the monolith into component parts, building a path to cloud using microservices and the SDVI Rally Media Supply Chain Platform.

"Rather than boiling the ocean I'd go for agile development of MVPs," Long advises. "Start sectioning up those MVPs to build your cloud supply chain bit by bit and you will end up with a really solid infrastructure. The clear direction of travel for us is having all of our content processing and management in the cloud."

Long's big picture ambition wasn't changed entirely. While Sky united as a single company with the Comcast acquisition, as an engineering company it has only moved to Group in the last 12 months. Impressively, Sky UK and its sister operations Sky Deutschland and Sky Italia have had their on-ramp to cloud supply chain managed at the same time but within a microservices-based architecture.

"The speed is what shocks me," Long says. "With cloud, the time needed to integrate and execute new functionality is significantly reduced. For example, using one of our on-prem workflows would take three to four months to process some assets. But when transitioned to cloud with SDVI the same workflow could be done overnight."

The cost efficiencies gained in moving to OpEx in the cloud are significant but are arguably of second order to the speed of the operation and the business opportunities it opens up.

"It is phenomenal what we have achieved but the potential is the future," Travis says. "We know we can process content in volume. We know we can distribute our content at volume and also how we can aggregate content from our third parties at volume. All these pieces are coming together."

Broadcasters like Sky shouldn't need to take this journey alone. Vendors and third-party suppliers are vital to reorienting the enterprise.

"You need a good relationship with your vendor and a partner who shares the same agile methodology and service philosophy," Travis says. "The right partner will advance its own technology at a very fast pace. We've seen the benefit of that in functionality from SDVI that didn't exist in our platform last quarter and is suddenly available for us to take advantage of."

Sky have learned the hard way but have emerged the stronger for it. "Building with microservices to the cloud is a mindset where we have to maybe fail sometimes but fail quickly, learn and move on," Long says. "Cloud enables us to do that."

"Don't be scared to make a mistake," Travis agrees, "because these things are fixable, small incrementable steps, which you can fine tune. Eventually, you will get there."

The implementation of cloud-based media supply chains at Sky illustrates the importance of organizational alignment, strategic leadership, and cloud-native media supply chain platforms like SDVI Rally. For more insights from our customers, including a video interview with Mr. Long and Mr. Travis, please visit https://www.sdvi.com/case-studies.

BROADCAST
THE BRIDGE
Connecting IT to Broadcast

CI
CORE INSIGHTS

EG
ESSENTIAL GUIDES


MEDIA


ARTICLES

For hundreds more high quality original articles and Essential Guides like this please visit:

thebroadcastbridge.com

10/2021

Supported by

sdvi