



THE RELUCTANT

REVOLUTION

**Breaking Down the Barriers
to Digital Production in Television**

A report for the Digital Production Partnership
by Mediasmiths International

dpp

digital production partnership

mediasmiths



THE NEW WORLD OF PRODUCTION WITHOUT TAPE

WAKING UP TO DIGITAL...

Digital file-based production is here. The tragic events of the Japanese tsunami highlighted a turning point in TV production where the reduced stock of HDCAM SR tapes highlighted the importance of tape, but also that the impact on the production community had been partially mitigated by the switch to file-based workflows.

While TV production has been digital for some time, it is digital tape that has been used as the means of exchange between different parts of the production workflow. The emergence of file-based cameras, however, is beginning to remove tape from the acquisition stage of the production process, and this in turn is prompting the production community to look at entirely end to end file-based workflows. When the source material is a file, it now seems a backward step to dub material to tape—something that did not seem illogical when the source material was on tape.

In the past year alone we have seen a fairly dramatic swing to file-based cameras, in part because they represent a highly cost effective means of delivering HD commissions. At the same time, there are external market factors that will alter the way that consumers access content, notably through “cloud” services, and already many companies are

examining how general market innovation can be applied to production.

The move to complete file-based workflows represents a tremendous opportunity for production companies and their clients alike. There is considerable scope for liberating the creative process from the craft technologies that characterised tape-based production. The future will be one of ubiquitous access to content, with an ability to view that content on standard devices (be they laptops, tablets, computers or smartphones), and a seamless movement of content without the need for dubbing to tape and booking couriers.

This digital vision has already been embraced by broadcasters, and the BBC, BSkyB, Channel 4, Channel Five and ITV have all invested in file-based technologies for production or distribution in the past three years. All broadcasters are now committed to file-based digital production because they can see the huge benefits in faster and more efficient production processes and in providing creative staff with better tools to allow them to focus on content not process. And, above all, they know that in a fully digital world they will be able to make greater use of content they receive.



... BUT FINDING IT'S NOT A DREAM COME TRUE

However, the path to a future tapeless world is not well sign-posted, and many producers feel far more aware of the dead ends than the fast-tracks. To misquote a famous song, the digital production revolution is not being televised.

The tapeless journey is one with which the Broadcasters already feel familiar, having themselves spent a good deal of time and money on trying to design and deploy end to end file based workflows. This activity has been sufficient to ensure the market now has plenty of vendors and consultants with views, opinions and products regarding media asset management technologies, file formats and wrappers, file transfer methods and the deep and dark cave of digital archiving. Yet comparatively little standardisation in each of these areas has emerged.

For production companies, this lack of established best practice means the rapid move to fully digital workflows still feels daunting, difficult and costly — at a time when production budgets are under intense pressure already. There are no market standards or industry practices available, and most production companies find themselves alone and in the dark trying to figure out how to make complete file-based workflows actually work.

OFFERING A TRUSTWORTHY GUIDE

The Digital Production Partnership (DPP) seeks to help illuminate the way for production companies in this new world. The DPP is an initiative formed by the UK's public service broadcasters to help producers and broadcasters maximise the potential benefits of digital production. It is focused on getting agreement and practical standardisation in areas such as metadata and HD delivery formats, and in identifying areas of recommended practice in digital production.

As part of this approach, the DPP commissioned Media-smiths International, a media technology services specialist, to assess how core technology trends in digital production, and specifically in storage, access and exploitation of content are affecting the production community, and what opportunities might exist both for suppliers and producers in making the digital revolution more achievable.

This report presents the findings from that work.

DIGITAL PRODUCTION PARTNERSHIP

KEY FINDINGS

The DPP's aim is to help identify the obstacles to digital production workflows, and provide practical ideas and guidance on how to overcome them. Some of those ideas are outlined in this document. The DPP's summary of Mediasmiths findings are as follows:

- ★ There are significant barriers to entry to the world of fully digital production for the production community. These barriers exist around technology, cost and operating practices
- ★ Vendors in IT and Broadcast Technology have pushed a vision of the future where file-based technologies and cloud services will transform production process, particularly in the area of storage and archive. However, the benefits of these technologies and services need to be made apparent and available to the production sector.
- ★ In particular, the DPP believes that a credible archive storage and retrieval model, which enables producers to exploit rights more easily would be very attractive. The same model might also enable producers to see benefits currently lost to them in reusing their own 'stock footage'.
- ★ The current reluctance on the part of producers to adopt new technologies and services, and to make the move to digital workflows is not the product of mere Luddism. Their reluctance is founded on a reasonable and accurate assessment of the risks, complexity and costs of making that move.
- ★ Greater recognition is required by service suppliers, manufacturers and Broadcasters, of the disruptive aspects of the digital production revolution upon the established production community. It remains the case that the IT-focused vendors do not seem to fully appreciate and understand the needs and requirements of the industry, and the Broadcast technology vendors have not yet fully acquired the capability to infuse their products and services with IT standards and methods. This disparity has left the production community to mainly fend for itself in the face of new and transformational technologies.
- ★ The DPP therefore believes that the move to fully digital production will only be accelerated by:
 - Common standards and requirements for delivery from UK Broadcasters.
 - Agreed best practice workflows consistent with these standards and requirements and endorsed by the Broadcasters.
 - Pricing models from vendors and service providers that cater for project-based budgeting rather than capital investment. The emergence of these cost models will be made more likely if property service companies and trusted facility companies act as gatekeepers: their capital investment could enable the pay-as-you-go service many producers require.
 - The publication by Broadcasters of their own digital roadmaps.

Our findings should not be a surprise — the production community has recognised the need for standardisation, flexibility and clarity of vision from broadcasters for some time. What is also clear is that nothing has happened, and nothing will happen, if the market expects these needs to be met through ground-up action. These needs will only be met by greater co-ordination and not from a killer application or end-to-end product suites from vendors.

Our findings highlight a real mandate for change, and the DPP is putting itself forward to act as a catalyst for that change: both this report and our activities in standardisation represent the first steps.

WHAT IS CHANGING?



THE IT FACTOR

Digital production systems have made increasing use of more standard IT technologies and approaches, but the relatively low level of experience and understanding of this type of approach in the broadcast market means that there is a danger that newer file-based approaches are simply replacing the tape and video based workflows on a like for like basis.

At the same time, there are innovations in the IT space, particularly in cloud-based services, that appear to offer significant potential for efficiency, savings and better ways of working, but are not readily understood by the broadcast market. There are three key issues facing the industry in this area.

- **A lack of common agreement:** There is a lack of industry agreement or co-ordination around the use of new file-based workflows, which acts as an obstacle to more efficient and effective exchange at the industry level, or even in most cases at a simple level between two collaborating partners. Even allowing for the different programme genres it should be possible to create more generic workflows.
- **A lack of understanding:** There is insufficient understanding, particularly among smaller market

players, of how to make better use of IT systems and approaches in improving end to end production workflows, and the benefits that could be derived from making this type of operational shift. Television production culture, and how IT approaches can both adapt to and change it, is poorly understood.

- **A lack of a credible business model:** Even where technical understanding exists, there is insufficient understanding of the size and scale of the market by the larger organisations that are trying to develop and sell services in this area. They have a tendency to develop large, enterprise scale systems that they then offer at a price-point significantly higher than most production companies, and even facility companies, can afford.

Although there have been attempts to put in place some industry standards or processes, too often they have been far too technical and driven by engineering rather than operational users.

Technology change may have been the driver so far, but the main focus should now be on co-ordination and dissemination of information, and on providing a common set of exchange standards that can help the creation of an industry supply chain.

WHAT IS THE KEY PROBLEM THAT NEEDS SOLVING?

As was noted above, the move to file-based cameras has prompted many producers to take reluctant first steps on the path to end-to-end file-based production.

But no sooner have those producers shot their file-based rushes than they have encountered the central problem of fully digital production: what do they do with their material? The safe, cheap, simple storage and retrieval of file-based video assets is the single greatest need of any producer heading into the tapeless future.

But can this need yet be met? And if not, what would it take to satisfy it?

This report focuses upon this simple but central issue. It has undertaken an 'audit' of the provision of storage services and workflow related services in the market, and in particular the applicability of new storage models including "cloud" storage and managed services, which could in theory provide common access to digital stores both during a production process and as a means of enabling distribution of completed content or access to archives.

The starting point for this review was to ask production and post-production companies what was changing; how they were responding to that change; which digital services appealed to them; and which, if any, they were already using.

INDUSTRY VIEWS

A broad range of companies, ranging from small to large, in London and the nations and regions, were interviewed and asked how they were responding to changes in digital production trends. Seven key themes emerged from this research.

1. FILE-BASED WORKFLOWS ARE NOW PERVASIVE.

All companies interviewed had done some form of 'end to end' file-based workflow, although in reality this means from camera to master, as virtually all companies dubbed to tape for delivery (one company used XDCAM optical discs for mastering). The use of Canon file-based cameras in particular was becoming prevalent, in addition to Panasonic and Sony equipment. All companies forecast greater use of file-based cameras, although most predicted a mixed economy in the near term, as tape-based cameras were considered more appropriate by some (or their clients) for higher end production.



It was interesting that lower costs, rather than any active desire to go tapeless, was the top reason given for using file-based cameras.

The method of getting rushes back to base was a mixture of removable hard discs where rushes were ingested in the field, or bringing back the camera's cards or discs.



No one regarded uploading content to a cloud service at the point of acquisition as being of interest.

Although all companies forecast greater use of end to end file-based workflows, most admitted that they did not fully know how they were going to support future workflows, and were not aware of any industry standard practices.

2. CONNECTIVITY COSTS ARE TOO HIGH FOR PRODUCTION VIDEO.

Only one of the companies interviewed had a fibre connection and the rest relied on standard consumer or small business ADSL services. When asked about spending up to £15,000 per annum for a fibre connection, the consensus response was that there was no justification for that amount of money to be spent on connectivity.



In fact, when asked about whether network connectivity would be a factor in determining where they might want to base their office, the response was that better connectivity was a nice to have rather than a core feature that they would look for in office accommodation.

This will obviously present a major challenge for them being able to access cloud services for high resolution content. One other option discussed was whether they would prefer using 'drop zones', for example if a local post production facility had high bit rate access that they could use to load material into a cloud storage device, or even send finished material to clients. There was no interest in this, nor in the post company even sending a runner. The one company that did have a fibre connection provided managed video hosting services for other companies, and therefore had a good reason — long term contracts — to justify the connectivity.

There was generally little awareness of what would be required for delivering final material over networks. Most companies interpreted file-based delivery of final material as meaning the use of a removable hard disc drive. The one company that was aware of file-based delivery over networks expressed a desire for broadcasters to provide some consistent guidance, specifically on bit rates for different types of delivery, wrappers and an agreed method of transfer.

3. PROJECT BASED BUDGETING IS THE NORM

Since all the production companies are spending money on the physical couriering of content, we wondered whether use of high bandwidth networks could pay for itself by removing the need for physical transfer. However it immediately became apparent that while network access is an overhead cost, couriers are project costs that can be included in project budgets.

» This highlights a key challenge for vendors and service providers — production companies want to pay in a way that is aligned to their income; that is, on a project basis. This project-budgeting approach may limit any new service unless the costs are “pay as you go”.

While this approach may be an option for those interested in using media management services based on cloud storage, the sticking point will still be network access, where there is no sign at the moment that any network provider will offer anything other than fixed term contracts and relatively high set up fees.

4. PRODUCTION COMPANIES ARE NOW USING MORE IT-TYPE STORAGE

All companies are using removable drives to exchange material, both from acquisition and through the production process. In general it was observed that:

- The smaller companies used consumer removable hard disc drives as their primary means of exchange
- Medium and larger companies used data tapes (of which the most common variety is branded as LTO) to back up rushes, and planned to use LTO for long term archiving
- Only the very largest had “enterprise storage”, that is, large rack-mountable multi-disc storage devices, shared over a network
- Many production companies either also used, or relied on, their post-production facility for backup during productions

The greater use of file-based cameras is going to present more challenges, as there is currently a reticence to wipe the cards, even when the project is in post-production.

» Companies will not be able to afford to hold camera cards for any significant volume of content and therefore will have to come up with storage solutions that are considered secure and robust.

5. NO ONE UNDERSTANDS WHAT “CLOUD” MEANS

Although ‘cloud’ as a term is widely used and understood in the IT space, this is not the case in broadcast.

» Most companies had no idea what “cloud” computing or storage meant, or meant for them, and among the few that were aware, there were reservations: there was a concern about the cost and the dependence on internet access for their production process.

This is not really that surprising, as “Cloud” is still very much in the technology domain. And in any case, the expression does not actually describe the function as it has been experienced by most small companies to date: they don’t buy ‘externally hosted and managed communications infrastructure’, they buy email services.

6. ARCHIVING IS NOT A KEY ISSUE (YET)

The use of new storage services, particularly cloud, for archiving has been frequently put forward as one way in which production processes can be transformed through new technology. There is an implicit assumption that all content is valuable and therefore keeping that content in a more secure and accessible place is of also of value. This was not borne out in our interviews.

» A strong and consistent message from virtually all companies was that archive content was not considered to be of value.

The exceptions were for iconic content or finished material that had re-sale potential. But no one reported that they made any significant use of archived rushes. One company reported that they believe that '99.9%' of archive content is of no value. This begs the question of why so much is held. However in a tape based workflow this is easy to see: tapes are generally not recycled, so putting video tapes in a box in off-site storage is perceived to have a cost of zero (no one interviewed knew what the cost of off-site storage was). On the very few occasions where archive material is required, then the tape can be retrieved.

As the cost of archive storage becomes more apparent then we would expect to see less content kept, and this is indeed what has happened — one company reported that they use the opportunity of an office move to do 'a major clearout' and another reported that they have cut archive content by almost two thirds.

Although most companies reported that they thought that they would make more use of archive content if it were available online, it was recognised that there would be a need to log content properly for this to work. As archive is not seen as of value, there was a concern that runners would be used for this task, and therefore the quality of logging would be variable.

» There are now some companies who offer logging services. When we tested pricing, producers balked at figures of £50 per hour of material or higher and responded that the price would need to be a fraction of that — in the range of £5 to £10 per hour.

We are not aware of any company offering logging at that price point. One company also raised the concern of security for online archives, as the heavy use of freelancers could leave production companies open to loss of content.

7. CURIOSITY BUT NO COMMITMENT IN NEW SERVICES (YET)

There was curiosity about new services, particularly media management services. There is also already some sporadic use of some collaboration services, mainly for review and approval. Some companies were now uploading low resolution files to secure areas of their own websites to share work-in-progress, in addition to using FTP and DVD services.

While some had used remote view, edit and logging services, there was very limited knowledge on the full capabilities of such services, and no one seemed to be aware, for example, of their online editing capability.

» The overall knowledge of companies operating in this market was patchy, as was the understanding of their pricing structure.

Although there was no interest in full resolution online archives, there was interest in the idea of a 'browse' archive where a cloud based service could hold low bit rate copies of content that could be searched, with the full resolution content held on local LTO based archives. Based on bit rates of 512kbs this would cost around 45p per full hour of content based on raw cloud storage, which may be getting into price points that would be acceptable. If the service was supplemented by a rights exploitation service, where the content could be accessed and sold to the wider market then this could make it even more attractive. While the retrieval costs for the full resolution version could be significant depending on the methods of retrieval, they may not be more significant than retrieving a video tape from long term storage and digitising it.

» There was considerable interest in this rights exploitation service idea.

However, the market is waiting to see what emerges rather than actively engaging, shaping or driving new services.

MARKET OFFERINGS

INNOVATIONS FROM THE IT INDUSTRY

Moore's Law is a concept that is used heavily in the IT industry to describe rates of historic progress and for future trends — it states that the number of transistors that can be placed on an integrated circuit board doubles every two years. The concept has been extrapolated more widely, and it is frequently used to describe the doubling of processing power every two years and the doubling of storage capacity of discs every two years at the same price point.

We are certainly at a point where the processing power and storage capability of IT equipment has become considerably more affordable to smaller companies and individuals. In the media space in particular, this has led to a belief that IT innovations will be transformational, since file-based workflows require a significant amount of processing (for encoding, transcoding and rendering), while the ubiquity of HD means that file storage capacity requirements are ever growing.

For this reason, we see periodic interest from IT companies in the Media and Entertainment industries, as there is a (untested) belief that the market must be huge because of the amount of content produced, stored and distributed.

The reality is somewhat different, and while there is most definitely an increased use of IT in media, the nature and scale of opportunity is not simple. We can separate out the application of IT in media in two ways:

- **Generic IT capabilities:**
relating to the use of standard, commoditised, IT elements in production
- **Bespoke IT capabilities:**
relating to the provision of products and services that are tuned for production

Generic IT capabilities have already made a substantial impact on the production community. Lower priced and more powerful computers, with more mass market editing software, has substantially lowered the threshold cost for editing equipment. The prevalence of low cost removable USB and Firewire drives in file-based workflows and the greater adoption of standard data tape (such as the LTO format) for long term storage are both very good examples of where the production community is making use of storage products with capacities that even 5 years ago would have been beyond the budget of many companies.

The most recent trend in the main IT industry has been in 'cloud'. 'Cloud' refers to the provision of applications or shared storage infrastructure via the Internet, typically where the applications and storage are virtualised across a number of different servers. For example, through the use of virtualisation, a single data centre can offer what we might call pay-as-you-go storage that does not restrict customers to specific storage devices. The biggest player at the moment is Amazon, with its Amazon Web Services; but Google and Microsoft are also major players. These companies sell services directly to users but also to 3rd parties who develop applications that sit on top of them: popular online storage synchronisation services such as Dropbox utilise Amazon Web Services, for example.

We found that production companies were not particularly aware of what Cloud meant both in general and for them. We believe that the relative misunderstanding, or lack of understanding, of 'cloud' is down to simple marketing:

- Amazon sells its cloud services primarily to developers or technologists who understand what cloud is. They can market cloud as a service because their market understands what that means.
- Other providers who sell cloud-based applications, meanwhile, tend to focus on the functionality delivered, not the technology behind it. Google Apps, for example, is a cloud service — but most of its users will think of it as simply the individual components of email, calendar and Google Docs. Similarly services like box.net focus on the ease and flexibility of online storage and synchronisation rather than their cloud underpinning.

The lesson here is 'Marketing 101': know your market and what they buy. While the production community do not understand or really care about 'cloud', they will be concerned about the functionality offered by such services. This would also explain why the take up of "managed storage solutions" by some IT and telco providers has failed to take off: they are selling technology infrastructure in the absence of an explanation of the problem they are supposedly solving.

In many respects, the production community is actually already making substantial use of cloud services, as many will be using Google or Microsoft email services; but they are not specific to media. Some organisations have attempted to provide more bespoke services for broadcast and production companies, primarily focused on 'media asset management' — that is, systems that manage ingest of material, indexing and storage, desktop access to browse, and content transfer. Historically most of these have come from major vendors, and have been "Big Plays". In other words, they have been pitched as major transformational technology services that are large scale and change core processes.

However, it is also the case that these services have been offered as “Big Plays” simply because that is what large IT vendors need in media in order to provide comparable revenue to other sectors such as telecoms and financial services. This may be the reason that none of these offers to date has managed any degree of scale or impact. HP’s Digital Media Platform, for example, was selected by Sony Pictures and Ascent Media in 2005 to “redefine content storage and distribution”, but the platform has not been widely adopted elsewhere. Most of the large IT vendors have been involved in large scale “transformational” deals with many broadcasters, and while there has been a lot of marketing on deal signing, there is precious little public information on successful deal completion.

But even if they had been successful, these Big Plays would not necessarily be of benefit to smaller organisations, since they probably could not afford them. From our review of production companies, none of them would be able to afford the systems that have been put in place even by small broadcasters. Larger production companies meanwhile would look at investing in systems that cost in the low tens of thousands, rather than low millions.

There have been some recent innovations that look to address this situation, and new managed services providing ingest, media management and content transfer are becoming available that are at least being marketed at production and post-production companies rather than just broadcasters. Aframe has received probably the most industry press, and offers a service that is directly marketed at smaller production companies as well as broadcasters. The post-production facility company Prime Focus have a managed service platform called Clear that is also focused on the wider production and broadcast community, as is the Tata Mosaic service from Tata Communications.

These new services provide some hope that the industry is beginning to create more tuned services for the production community — although the market will need to address some of our findings, notably that archive may be a difficult sell.

OBSTACLES

Delving into new services further we believe that there are three major roadblocks to adoption of new services, even if the industry finally stops focusing on selling what they have and starts addressing the needs of the production community:

LACK OF NETWORK ACCESS:

Currently most production companies do not have access to high bandwidth networks required to distribute file-based content over the internet

ECONOMICS OF NEW SERVICES:

While many new services are cheaper than before, the production community has found solutions that might be less elegant but are most cost effective

RISKS:

The centralisation of content and applications in a managed service brings with it the risk of what happens if that service fails or changes

★ OBSTACLE 1: NETWORK ACCESS

The largest single impediment to the adoption of new services is bandwidth, or rather the lack of good affordable upload capability. There are two specific problems facing smaller production companies:

- HD content requires high speed internet access for uploading. An HD file at 50 Megabits per second (Mbps) would require an effective upload speed of 50Mbps to transfer content in real time. AVC-I material at 100Mbps would require twice that for real time transfer. While download speeds on small business ADSL packages can approach 50Mbps, upload speeds hover around 1Mbps. This means that they would need to access higher bit rate fibre or fibre-based services to transfer content to a service provider or customer
- Even if they did get higher bandwidth internet, they typically only need “bursts” of access, for when they want to move content, meaning that an expensive high speed internet connection will be heavily underutilised most of the time.

For smaller companies fibre-based services will be too expensive. Within the M25 area, fibre services for 100Mbps connection can cost £15,000 per annum with a £5,000 connection fee. For a large company, this would not be a problem, but for a small production company this could equate to what it would pay for its annual office accommodation, and based on our interviews is seen as unjustifiable.

★ OBSTACLE 2: ECONOMICS OF CLOUD STORAGE

The cost of cloud services is coming down and is now at a point where at least superficially it looks quite affordable. At the time of writing there were three main pricing mechanisms around cloud storage:

- Transfer In: the cost of transferring material into a cloud storage system. Prices were typically in the US\$0.08 to \$0.10 range (note, pricing is typically quoted in US dollars as the most price-effective players tend to be larger international companies)
- Monthly Storage: the cost of storing content, typically with full backup in the same site. Prices were typically around \$0.15 per Gigabyte (GB) stored per month
- Transfer Out: the cost of transferring content off the platform to another service provider or device. Prices were around \$0.15 per GB

Taking a model where 10 hours of AVC-I 100 content (e.g. P2 rushes) are uploaded, stored and eventually drawn down, the cost per hour of content would vary depending on the number of months stored, as shown in the charts below, although there will be an additional £42 charge if all 10 hours are drawn down.

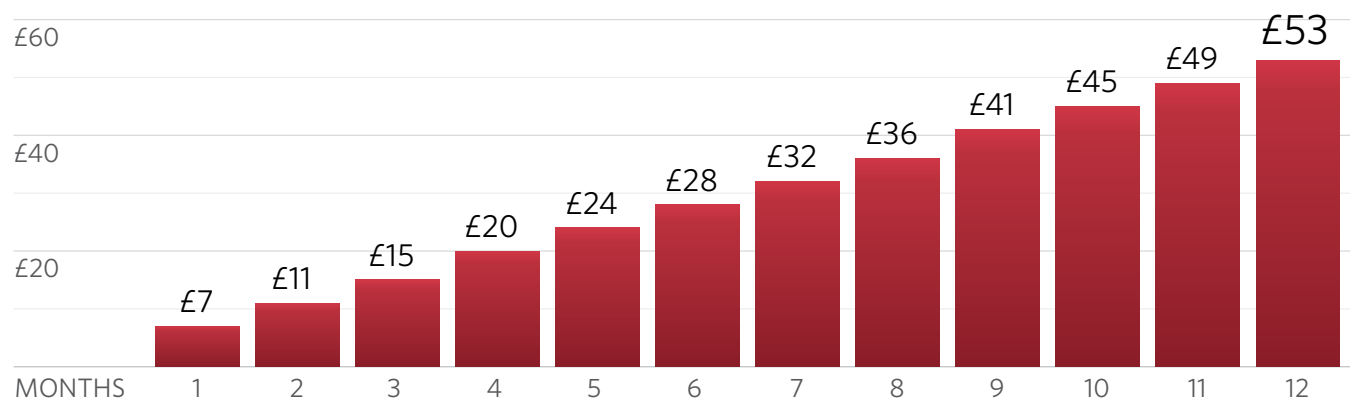
If content is held for relatively short periods of time, then the cost of cloud storage looks relatively attractive if it were compared to traditional media such as tape: at the 6 months mark the cost of cloud storage would be £28 per hour, which might be considered comparable to video tape storage costs. However for longer periods the on-going monthly costs begin to rack up and over time cloud-based storage is beginning to look comparatively expensive just as a means of storage.

However the production community has been more ingenious (from a cost perspective) at how it manages file-based storage, as confirmed in our interviews. The comparator is not video tape, but removable media drives and LTO tape.

The table to the right presents the comparable costs of using cloud versus removable drives and LTO data tape. Included in the table are access costs: cloud would require a fibre-based internet connection and LTO would require a deck capable of reading and writing data tapes.

The first point to note is that cloud is more expensive both in setting up and managing content long term. Cloud requires high bandwidth network access, and therefore a fibre connection, the set-up costs for that connection, meaning an initial cost of around £20,000 in the first year just to start using the cloud. Holding content online for a year at around £0.10 per month means an annual cost per GB of just over £1.

COST PER HOUR



Approach	Set Up Costs	Access Costs	Year One Media Costs per GB*
Cloud	£5,000	£15,000	£1.19
Removable Drive	£0	£5,000**	£0.43***
LTO	£2,000-£15,000	£5,000**	£0.12

* Cloud cost is per annum based on one upload and 12 months of storage. Assumes only one copy as Cloud provider is backing up. Tape and Disc assumption based on two copies.
 ** Access costs based on assumption of 2 couriers/taxis per week, costing £50 per time.
 *** Removable drive based on GRaid 1TB drive, with 800GB usable.

★ OBSTACLE 3: RISKS OF CLOUD OR MANAGED SERVICES

By contrast, using two reasonably robust removable drives works out at an effective rate of less than £0.43 per GB, which, if one assumed a five year lifespan for the drives, then this would lower the effective cost to 8p per GB. However, this approach may require couriers or taxis, and so assuming the use of couriers twice a week, would generate a cost of around £5,000 per annum.

The use of LTO tapes lowers the cost even further, as an LTO-5 based system (assuming only 80% of each cartridge is used) costs only 12p per GB, which would fall to 2p with a five year lifetime or 1p with a ten year life span for the drive. The LTO upfront costs do include the cost of a drive and the backup software. However single slot drives start at £2,000 with larger two drive units, with a small number of internal slots for cartridges can cost up to £15,000. Backup and record management software can cost in the low thousands, but IBM has made the LTFS (LTO File System software) available for free. LTFS allows the tape drive to be mounted as any other disc or flash based unit, meaning that content can be drag-and-dropped to a LTO drive as with any other drive.

A key conclusion is that cloud based storage is only really applicable for 'temporal' storage needs (i.e. short term and timely) and where content needs to be accessed by multiple parties, or it is used as a short term backup. In other use cases, a combination of removable drive and LTO is a lower cost and effective solution, already in use by the industry.

By some way the most significant potential issue that will affect the take up of cloud services is the concern about uninterrupted continuity of service. The production community knows and trusts tapes, and belief in non-tangible offline services will not be the easiest bridge for many to cross.

With cloud or even managed services there will be a concern that they can only be operational as long as their internet connection is working (which for small companies can be a concern). There is also the more substantial risk of how to retrieve content if the service provider goes bust or is acquired.

To compound these fears, the Service Level Agreements (SLAs) of many providers are unlikely to meet the requirements of major broadcasters, and will make production companies nervous. These SLAs typically restrict the credits for a drop in service to relatively low levels. Of even greater concern to smaller companies, there will be clauses that restrict or do not accept any liability from loss of service: i.e. if your content is lost, or your account deleted, then you have no immediate case for compensation.

If the worst does happen and a service provider is no longer operational, then a company will incur cost and delay in transferring content to another provider (or even its own storage). The more content held with the service, the bigger the problem: this is probably one of the key reasons why broadcasters have not embraced cloud storage for production.



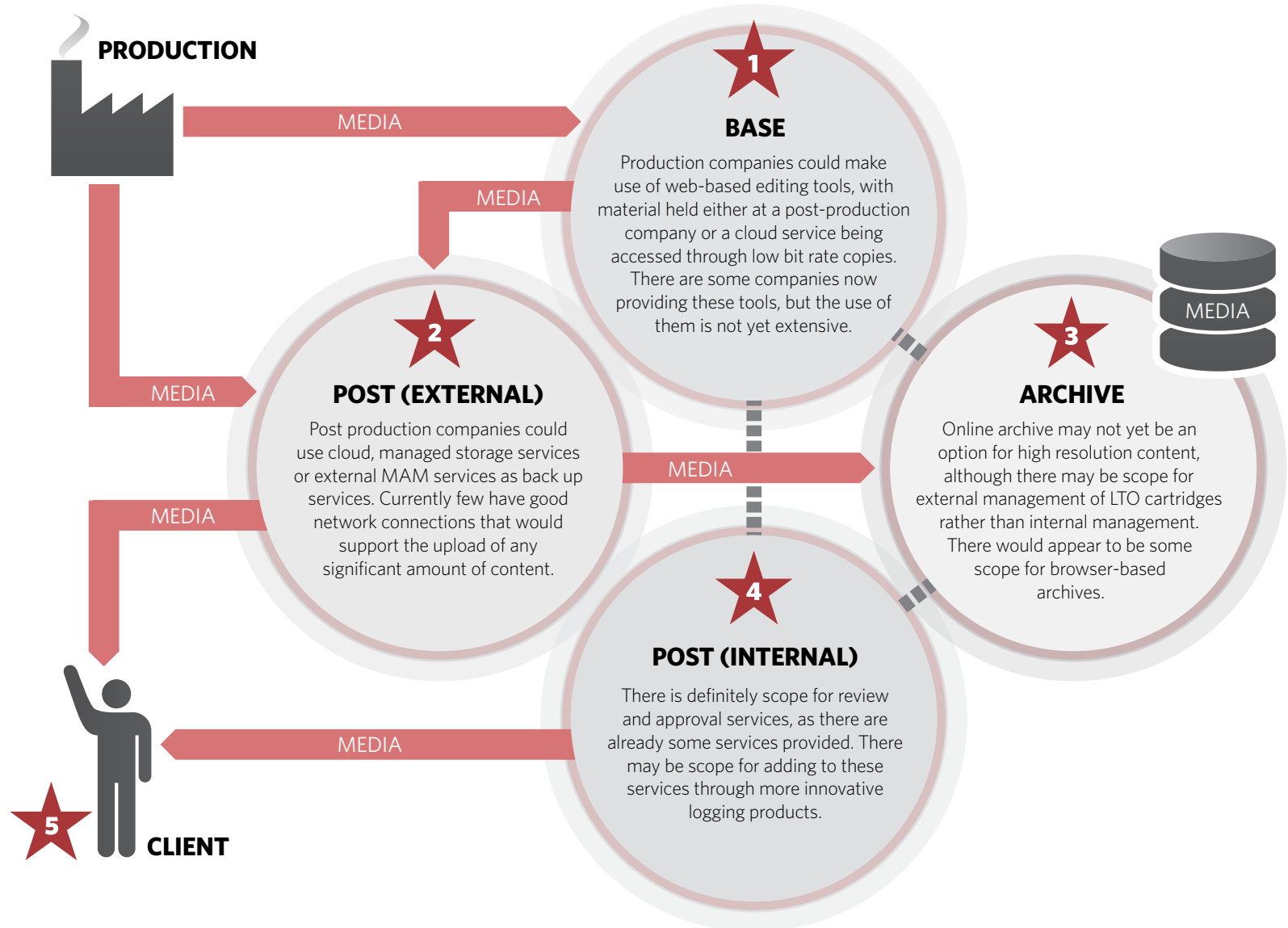
OPPORTUNITIES FOR FUTURE SERVICES

So where does this leave us? Are Cloud, managed services and all new IT innovations really of no value to the television production industry?

It's clear that there are significant challenges in getting production companies to adopt new services and in particular it would appear that much hyped cloud-based services will struggle. However we believe that there is considerable scope for improving and using new services in the core production workflow — although they will require better information if they are to stand any chance of mass adoption.

The starting point has to be to examine *where* file-based workflows are impacting companies, and therefore *how* new technologies or services could help.

This schematic presents a view of where potentially new services could help streamline a core production workflow. We see this approach as a pragmatic tactical first step in identifying where and how new technologies could impact and improve workflows.



PRODUCTION



There is currently no appetite for any considerable use of cloud services at the point of production. There is some use of low bit rate review tools, but this appears to be limited to review. The sheer diversity of locations used for shooting television production may mean there is no viable service offer in this part of the production process for the foreseeable future.

BASE



OPPORTUNITY

Three characteristics dominate this part of the production process. First, nothing is more precious to a production company than its rushes. Second, the world of editing platforms is currently dominated by a small number of established and trusted brands. And third, pricing structures for editing are well understood.

Any new or existing company which sought to provide web-based editing tools while explicitly satisfying these three characteristics could find a strong market for their services. Pricing needs to address the project-based nature of programme budgeting — and must take account of the total cost of production in the fully digital realm.

POST (EXTERNAL)



OPPORTUNITY

There could be considerable market opportunity for post production companies who give as much priority to capital investment in good network connections, and associated managed service storage solutions, as they have in fixed technology assets. It is possible the trend towards in-office editing could be reversed if facilities offered low-cost browser-based editing and managed storage as a service.

ARCHIVE



OPPORTUNITY

There may be some opportunities for local, geographically based solutions where there is an existing density of production companies. The broadcasters themselves may have a role to play in developing centralised archive models, since they already have a strong requirement of their own.

POST (INTERNAL)



OPPORTUNITY

Ease of use is key to these services. Logically they should feel like a low-cost, user-friendly wrapper to the online editing services offered by External Post.

CLIENT



OPPORTUNITY

As file-based workflows become more complete, there is scope for delivering final content as files over networks. Currently the lack of high-speed bandwidth is the major impediment to this happening.

Property offers which recognised this need, and offered a managed service on a pay-as-you go basis, while also recognising the need for keen and flexible pricing on office space, could quickly prove popular — particularly as the Broadcasters will move to file-based delivery as standard within the next two to three years.

CONCLUSION: TAKING RELUCTANCE OUT OF THE DIGITAL REVOLUTION

We believe that the industry is going through a revolution. This may not be a commonly shared view in the industry, and indeed many may argue that the core process for making programmes has not changed, and that our digital revolution is merely changing some of the tools that are used. At one level this is of course true, but only in the same way that it is true to say that the printing press did not change the process of idea creation, putting words on a page and binding those pages. The digital revolution has democratised programme making in lowering the technical and financial costs of making content. If one stops for a moment and thinks back just ten years, the degree of power and flexibility we now have in everyday tools is a world away from what we had then.

The move to end-to-end digital production is inevitable but the pace of change is limited by the lack of clear signposts, and therefore a reluctance in the production community to set off on the journey. This apparent reluctance will not stop the transition and the production community needs to start thinking more seriously about how to respond. The famous quote from Darwin that stated that “It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change” is highly pertinent. The stark message is that those

companies who do not embrace and adopt full file-based ways of working will die. The positive corollary is that those organisations that do embrace file-based workflows can exploit the opportunities that they present.

- For production companies, a well thought through end to end file-based workflow can: reduce the cost of material (no more tapes, DVDs and couriers); reduce timescales (with less time spent on ingest and dubbing to tape or DVD); give their creative staff more control of the process (with their material on hand, and shapable, from anywhere, at anytime); maximise the use and reuse of expensively acquired material (by making it easily searchable and retrievable). Much like the world of consumer digital content, the content owner can shape, copy and distribute – even if an understanding of the underlying IT infrastructure that makes it possible remains for the specialist.
- For service providers, such as post-production facilities, a fully digital production environment offers potentially new markets in media management and storage, and more business in content distribution where the use of web-delivery tools lowers the cost of sending content to international customers. A failure to provide such

facilities may encourage larger production companies to invest in the underlying infrastructure themselves

- For broadcasters, many have already moved, or are in the process of moving to end to end file-based working – thereby saving time and money, and simplifying the distribution to multiple platforms in multiple shapes. They will be expecting their suppliers to support these new workflows. Historically in broadcasting, the medium of distribution has always shaped the medium of creation; file-based will be no different.

The opportunities presented by file-based working are focused on reducing cost and time and increasing flexibility. In practical terms this means that the opportunity on offer is competitive advantage. For production companies this means being able to get more out of shrinking budgets and easier access and delivery to more customers.

The key to ignition for this slow-moving revolution is the acceptance by all concerned of the day to day realities faced by the production communities, and an understanding of where and how the benefits can be identified and achieved.

Out of understanding and adaptation can come opportunity.

The Digital Production Partnership (DPP) is an initiative formed by the UK's public service broadcasters to help producers and broadcasters maximise the benefits of digital production. The partnership is funded by BBC, ITV and Channel 4, with representation from Channel 5, Sky, S4C and the independent sector on its working groups.

For further information about the DPP please go to:

<http://www.digitalproductionpartnership.co.uk/>



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