WHO'S AFRAID OF AI?

SEAGATE

An Integrated Storage Solution from Camera to Cloud

With more than 40 year's experience, Seagate's product range has delivered a core technology stack that brings hyperscale cost and end-to-end architectural efficiencies to the enterprise across software, silicon, system, and device innovations. Seagate Storage solutions were designed with M&E in mind and directly address the data management challenges from camera to cloud.

With Seagate Lyve, you can freely access your post-production media from any environment and achieve long term cost predictability. On-Prem or Lyve Cloud content repositories offer advanced CAPEX or OPEX solutions with no ingress, egress or API fees. Seagate offers block and object storage with superior value. Seagate storage products help you to store, protect and transfer valuable media assets across any environment (on-prem and in the cloud), wherever it is needed. Vertical integration with Seagate offers cost advantages and can help you reduce significant TCO when compared to solutions that aggregate storage providers.

Furthermore, managed migration by Lyve Cloud supports hassle free onboarding of the data to the cloud and provides easier and faster content retrieval.

With Seagate there is no compromise on performance to meet your goals - reduce costs while keeping your media in a highly available (99.9% availability), super durable (> 11 9s), reliable and truly confidence inspiring combination of storage solutions.

We Craft the Datasphere.

seagate.com

On the evening of the 15th March, Televisual gathered together some of the post community's finest business and technical experts to discuss the rapidly changing nature of post production and vfx. The evening dinner and discussion was kindly sponsored by Seagate Technology.

The debate took in multiple aspects of this change, with a strong emphasis on the cloud, but became more animated when the panel discussed Machine Learning, Machine Automation and Artificial Intelligence.

The Roundtable Panel included:

ADRIAN BULL
ceo and founder, Cinelab Film and Digital

FIONA BURTON
post production and production technology specialist

DAVE CADLE
ceo and co-founder, Envy Post Production

NATASCHA CADLE
creative director and co-founder, Envy Post Production

ZEB CHADFIELD
chief vision officer and founder, The Finish Line

DAVID KLAFKOWSKI
ceo, Racoon

ADAM LUCKWELL
owner, Unit Studios and Miscellaneous Studios

KEVIN MCCUE
director of group production platforms, Sky

TOM MITCHELL
technical director, Mission

ANDREW PALMER
enterprise data and cloud solutions group, uk lead, Seagate Technology

MICHEAL SIENCZAK
head of technical operations, Fifty Fifty Post

RICH SIMPSON
managing director and co-founder, Hijack

DAVID THOMPSON
emea systems sales manager, Seagate Technology

DUNCAN WESTERN
co-founder, Splice Post

TOM WOODALL
director of post production, Molinare





The Banshees of Inisherin, Cinelab

All change please

SIMPSON: It all depends on how good AI really becomes. When I look at ChatGPT, OpenAi, DALL-E and Midjourney, they all hold such promise. The last time most of us felt like this about technology was probably when smart phones were first introduced.

MITCHELL: The problem with how we work today is that it's an incredibly labour-intensive, manual process and involves a lot of top-level orchestration, whereas we mere humans can introduce error. We also seem to have a labour shortage. These amazing Machine Learning and AI tools have the potential to revolutionise how we work, from optimisation to building completely new tools and services. They were made possible due to the technology only being found in the cloud and being able to process huge data sets on custom silicone. The current travesty here is that in film and TV, workflow is predominantly not in the cloud and is therefore, for the most part, unable to leverage this.

I doubt most people aspire to filling out spreadsheets or copying data from a FileMaker Pro database into their vfx tool or watching render bars. We leave aspiring talent tied up for two to three years doing donkey work, almost as a rite of passage. Imagine if we can free these people up and have them doing what they are good at, doing what they really want to be doing. We would get people trained up faster and our talent pool would open up.

The film industry is ripe for a serious upgrade in how we are working, with new tools, tech, optimisation and AI/ML I would argue that we are about to see a bigger transition over the next 5 years than that of the impact we had when we moved from film to digital.

Next Gen

SIMPSON: In a traditional post facility model, there are staff waiting for people to die or move on. They've been sometimes working for ten years to get to the job they want. With media creation becoming more democratised - a lot of new technologies are already on our phones. People will be able to create higher quality images more easily. And in turn all these lower-level skills become increasingly redundant to a point where nobody will ever need them. Amateur filmmakers will not need them and will be coming in at a higher level and finessing, rather than grappling with the process.

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>
> **TOM MITCHELL MISSION**

CHADFIELD: When you look at younger adults, many of them are already using the skills that we have all learned over the years, so those skills are transferrable. In a way, maybe our job then is to figure out and transfer their way of operating into what we see as relevant, and our way of operating.

Where does ML, MA & AI have a role?

PALMER: Seagate uses AI a lot and it's the low-level functions that we've automated, In our production processes, we pump out millions and millions of hard drives every day. We start off by digging raw materials out of the ground and then a year later - and 26,000 processes later - we produce the hard drive.

And every stage of that process is photographed. Using AI we compare it to a golden view of what hard drives should be. That way we can detect nuances within the design and when we make our ASIC devices, we can compare the actual product to what it should be. By doing so we can see when things are moving away from the high quality product.

This way we can intervene much sooner and before it goes into the field. It's all the low-level stuff that a human couldn't do fast enough that we use AI for.

WOODALL: What you're describing is subjective. The whole point about speeding things up is that it's binary, it's either right or it's wrong. The whole process that we intervene and interfere with is subjective. It's creative. We like to have



Killing Eve, Season 4, Sid Gentle Films for the BBC, Molinare

input because it's neither right nor wrong where AI is currently binary.

BURTON: When making films or being creative, AI is helping us get rid of all the mundane technical stuff so we can be more creative. Things are going to get more complicated and we're going to need that support. I don't think there's any sense in which we're going to lose jobs.

KLAFKOWSKI: Over the coming years there will be more productions, producing more data, and production workflows will become more complex to manage. We need smart AI and ML tools to intelligently aid us in managing all this data and prevent the complex from becoming too complicated. Intelligent workflow and resource management application layers (like Tanooki) will enhance human creativity and not detract from or replace it.

We need to embrace these tools and not fear them, are you frightened of spell check? If used wisely, they liberate us from the mundane and allow truly creative thoughts and ideas to shine through.

MITCHELL: Although we always have to learn new skills, we are about to see the order of the underlying complexity go up exponentially. Take the mobile phone, there is no one person on this planet that can build one from scratch. No one knows it all!

And though a post house has a small team of engineers, the increasing levels of complexity will be too much for them to cope with. But that's OK. Software and technology companies will build turn-key solutions that will abstract that away so post can focus on managing the talent and their clients. If anything, we're looking at an easier and much less complex future for the facility. But the transition to get to that point will be a bumpy ride.

BULL: We have so much to gain from AI and ML. Although editing and grading could be automated for some genres already, there are so many other technologies that could improve efficiency and creativity that currently have minimal adoption. Facial recognition with emotion detection, object recognition, location and shot type are all possible and very much underused but could considerably improve the efficiency of working with both new and archive content.

Can grading be automated and to what extent?

CADLE (D): We've all got colourists that have different styles and approaches. You'd like some of it to be automated to take you to a point – and that might include colour correction - but they're still going to have to finesse it. It would definitely make their jobs quicker and easier.

CADLE (N): The question is, where is that equilibrium point where the machine starts and the person begins.

BULL: There's no doubt at all, that from an AI perspective, you can take a finished movie that's 750 shots. You can look at all the main sequences and say, 'okay, this is how I want that interior to look, based on the lighting that's there' and there is absolutely no doubt AI can do the analysis of the rest of the clips and identify the same sequence and the same scene. But there is a decision that needs to be made about the storytelling within grading - which is a step forward from AI - to understand that, for example, the emotion in the film is getting darker rather than the emotion being consistent.

So, yes that colour correction aspect and making sure everything looks technically correct is possible. The second stage of grading - which has evolved significantly over the last 15 year with the technologies that we have available - is adding the emotion and creative look and taking the viewer on an emotional journey through the use of light and colour.



U-Boat Wargamers, World Media Rights for Sky History, The Finish Line

MCCUE: Let me play it back in quite a different way. I think we're getting into the debate on something that's cost a lot of money to make and trying to devalue something that has a low cost within the value process; that isn't going to draw attention. So, let's say that within the $300 million movie, they spend a million dollars grading it. You're not going to AI that out. There is limited value in trying to pool these processes out.

Let me talk about the other end of the market. Say, I've got rights to the Premier League, I've got rights to all the different levels of the EFL, Scottish football and women's football. And I want to super-serve clips to all my viewers. I want to make this value-added application where every time your team, or a team you're following, scores, you would get zapped on the phone. Can I afford to have an editor sitting in the suite watching one match, clipping and publishing based on that level of personalisation? No, I can't afford to do that. Can an AI engine do that for me and also publish that to the customer? The ability to deliver hyper-personalisation makes 100% sense and it has commercial value.

Are films and TV shows going to be completely produced within a games engine?

SIENCZAK: It's a tool in the kit box to make the previews better. It is getting increasingly easy to produce films entirely based on vfx. But I don't think there's any interest from people paying to watch a film with say, Tom Cruise, to see him being animated. People go to the cinema to see Tom Cruise act.

LUCKWELL: It's not going to have an immediate impact on post production. You might want to storyboard a film so that you can test run it in front of an audience. Let's say it's going to cost the studio a million dollars, and they can write that off as an investment. That's not going to have any impact on the post market. You're still going to spend the $300 million on the movie.

CHADFIELD: Film and television production has always been a technology driven business and that won't change. Companies will continue to adapt or die as they always have. And we've got to be willing to cannibalise our own markets, because that's part of the process of development. It would be idiotic to believe AI won't have an impact on the business and it already is having an impact in many ways.

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>
> **ZEB CHADFIELD**
> **THE FINISH LINE**

The market and services provided right now are different from what they were five years back and different again from five years before. All that we have seen happen is content production accelerating and more space opening for different niches. That will continue and I believe all the facilities that have an eye on the tech and the capacity to invest in it will evolve to utilise it. Or vanish.

MITCHELL: There's nothing wrong with any of the changes we're experiencing now and the development of new things that haven't existed before. As an industry, we have always adapted. The only problem is that if people don't embrace those changes, they can only fall behind.



My Policeman, Cinelab

NEXT GENERATION STORAGE

At the end of the *Televisual* Roundtable presentation (pages previous), Seagate Technology's Andrew Palmer, shared some insight into the future of hard disk drives – including the new Seagate Lyve S3 cloud offer, a new technology that significantly increases hard drive capacities, to 'self-healing' hard drives and recycling.



Andrew Palmer
UK Channel Lead
Enterprise Data &
Cloud Solutions Group
Seagate Technology

"Seagate has been making hard drives for the past 45 years. For the past ten years we've been building hard drives and putting them into other vendor's systems, as OEM. There are three vendors who build hard drives, and we build almost two-thirds of that total.

"When we were discussing what storage systems you were all using earlier [in the Televisual Roundtable discussion], I can't recall any of the group naming any vendor except pixitmedia. We work closely with Ben Leaver and pixitmedia – as we do many M&E storage vendors - and it's probable that you're already using our storage.

"We've now got new iterations of that storage that we're exclusively selling. For example, self-healing systems; systems that look after themselves and don't need any user interface. And hard drives with far greater capacities and plenty of room to grow with our HAMR technology platform.

"It was a logical next step to start adding that technology into our own Seagate branded storage systems, providing our customers with unprecedented technology innovation and TCO. And another milestone in our product portfolio is Seagate Lyve Cloud storage as a service, launched last November in the Equinix North London data centre.

We get the hard drives at cost and we're getting economies of scale already that aren't available anywhere else in the world. Seagate Lyve has no ingress or egress or API fees and we're offering S3 storage at a flat rate of $10 per terabyte.

THE FUTURE OF HARD DRIVES

"You might think that SSD will take over, but the future is bright for hard drives. We're at a turning point where far greater capacity is going to be available on a three-and-a-half-inch drive. There's a roadmap to delivering 100terabyte hard drives. We've already manufactured prototypes.

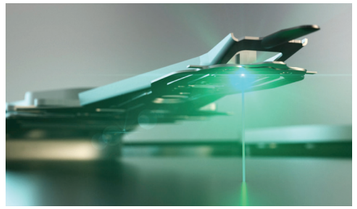
"We've been adding incremental density to our drives over the past few years, along with other vendors, and we now offer up to 22 terabytes on one hard drive. But that's now set to radically change.

"Our development team both took a different fork in the road twenty years ago. We developed a new technology that sits within our drives called HAMR. HAMR stands for Heat Assisted Magnetic Recording.



"A hard drive is made of platters, each with thousands of concentric grooves – think of it like vinyl – and there are almost 2,000 grooves in the space of the edge of a piece of paper. We sprinkle a bunch of tiny metal particles – kernels - into those grooves and that's where we store data.

"The platter is spinning at up to 15,000 rpm on the outside edge of a standard nearline drive, which is the equivalent of 75 mph and yet across it is a read/write head flying over the surface. The flight height of that read/write arm is Angstroms

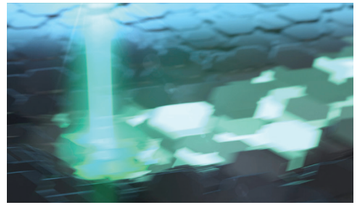


high. Angstroms is a very small measure. Your fingernail has grown more in the last eight seconds compared to how high that arm flies over the surface. And if it senses vibration, it parks the head and stops writing or reading until the vibration passes, because if it hits the surface, it's a catastrophic failure.

"As the read / write head passes across, it will turn the kernel, from a positive to a negative charge by flipping it over - negative-positive, one-zero, one-zero - as binary code which sits behind all computer language. This is achieved by heating up a little dot on the hard drive and very precisely flipping that kernel from a one to a zero in a unique way. The 'heat' comes from a laser, runs into a near filed transducer, from which comes a plasma ray.

"To achieve greater density, you need more and more kernels that are compressed within the platter groves and then you need to find the right kernel to convert it to a one or a zero. HAMR enables us to have more kernels within the platter.

"The beauty of HAMR is that with this technology we can build higher and higher densities – that's called areal density – into a similarly small space with a similar energy consumption. The cost per gigabyte becomes cheaper both in terms of the hard drive build and the energy needed to run it.



SELF HEALING

"The larger the drive, the longer it takes to rebuild the drive if it fails. A 20-terabyte drive typically takes from seven to 10 days to repair. If we're building larger drives, the risk would be that repair times get longer too.

"I'll take the 20-terabyte drive as an example: you've got ten platters in it - that's 20 surfaces top and bottom - that's one terabyte per surface.

"Now, imagine the head touches the surface, that surface goes bad, the drive gets wiped out. You've thrown 19 terabytes away because it's damaged one terabyte worth of data.

"Instead of doing that, our new Seagate Autonomous Drive Regeneration technology can isolate and trim the platter, or the surface, as opposed to the whole drive, and attempt to reformat it. If that fails, the surface is already isolated, and the system is clever enough to make use of the rest of the drive capacities. This prolongs the lifecycle of the product.

ENVIRONMENTAL CONCERNS

"The planet's resources are finite. Globally hundreds of millions of drives are shredded every year. Our new hard drive encryption enables instant secure erase. Just delete the encryption key and the data cannot be used and the drive can be safely recycled. Drives contain precious materials that are becoming more and more expensive, so there is an economic as well as environmental advantage to re-cycle these components. For example, over 1million metric tonnes of magnets have already been repurchased and recycled.

"Seagate ship tens of millions of hard drives a year and each drive uses 61 different elements from the periodic table. The planet's resources are finite and with the expectation of exponential demand for storage, this is clearly neither desirable nor sustainable. Not just from an environmental perspective but from a supply chain management standpoint.

"On the one hand we've shored up the integrity of our supply chain to minimise waste and pollution, while on the other we launched Seagate Drive Reman – standing for Remanufacturing - last year. The core principle is that we can refurbish, reuse and recover materials in our products from the components within older or failed drives. Far from being something that was a 'nice to have' because it promotes great sound bites for the media, the fact is it makes very good business sense.

"The simple truth is that the requirement for storage is only going to grow and in turn that has an environmental impact, but our business imperatives can and do align with our corporate responsibility to address this issue and we have taken meaningful steps from both a technology and CSR perspective to do so."

At Seagate, we believe that a sustainable future is essential to the success of our business, the well-being of our communities, and the health of our planet. We are committed to reducing our environmental impact by minimizing our carbon footprint, conserving resources, and protecting natural ecosystems.
Our goal is to be a responsible corporate citizen that actively contributes to a more sustainable world for all.

Last April Seagate committed to using 100% renewable energy by 2030 and achieving full carbon neutrality by 2040.

SEAGATE TECHNOLOGY'S INTEGRATED M&E STORAGE ECOSYSTEM

Vertical integration with Seagate offers cost advantages and can help you reduce significant TCO when compared to solutions that aggregate other various storage providers.



Seagate Lyve Mobile Array
Designed for (S3) edge storage applications with high data volumes, this portable, rackable solution easily integrates into any data management workflow.



Seagate Exos X 5U84
Exos X high-density disk arrays employ the HAMR solution and deliver up to 1.5 petabyte (PB) of raw disk space in just five rack units, ideal for Tier 2 storage.



Seagate Lyve
The new Segate Lyve data centre in North London offers no ingress, egress or API fees with S3 storage at a flat rate of $10 per terabyte.

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