How Collaborative Editing Makes Creatives More Creative

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Why "Live and Unlocked" Is the New Paradigm for Post-Production

When it comes to the evolution of collaborative editing, Simon Haywood, Dell EMC CTO, Media & Entertainment in EMEA, takes the long view.

Haywood put in time as a satellite engineer for the BBC before joining Isilon, and he remembers when editing was an intuitive, linear process that resulted in a videotape that you could hold in your hand, put in a VTR, and play out to air. For years, the videotape was a kind of security blanket for video pros. It was their camera negative, or their broadcast master. If you could hold a tape in your hands, or label it and put it on a shelf, you knew where your footage was at all times.

"It was really easy to understand — tactile — but entirely unsuited to any sort of collaboration or enhanced workflow," Haywood says. "If you were doing one thing on your own, great. But the technology we have now allows you to do many things, in many different places, in parallel. We've gone from a serial world to a parallel world where we can all work together on the same material."

At Isilon, immersed in the IT-based world of network-attached storage, Haywood was a video guy who knew more than how many bits and bytes a storage system could push down the pipe. He knew how many simultaneous video streams it could support. That was the most important metric in a media world that was quickly evolving storage devices from basic one-to-one SDI-based VTR replacements to networked systems with unprecedented capabilities. "EMC storage can support an astonishing number of playout clients, and that wasn't even dreamt of when digital storage of video first came about," Haywood says.

> "Collaborative workflows, multiple versioning — if you build the technology, they will come."
>
> Simon Haywood, CTO, Media & Entertainment, EMEA, Dell EMC

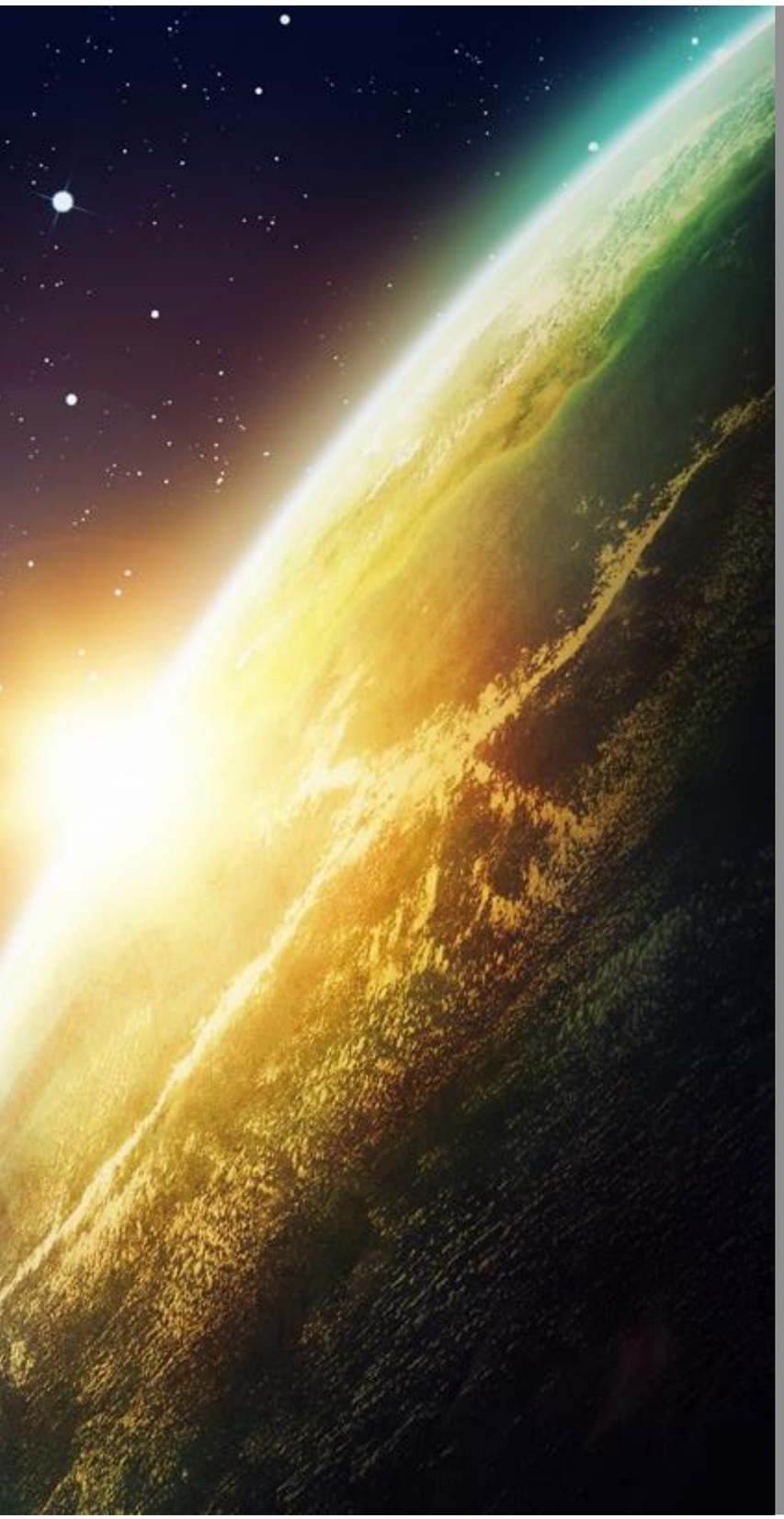
The two factors that make collaborative editing possible are shared storage, which gives multiple users simultaneous access to the same media, and fast networks, which allow geographically dispersed teams to share ideas and make decisions together. These creative teams remind Tom Burns, Dell EMC's CTO, Media & Entertainment in the Americas, of the trend in computer science toward agile programming methodology, which is defined by what's known as the "scrum" framework. Spurts of intense creative activity, or "sprints," are scheduled over fixed durations, leading to checkpoints where work is paused and completed pieces of the project are reviewed.

"You always have a continually refined product to show," Burns says. "I honestly think creative processes are learning a bit from agile programming processes, including pair programming and continuous iteration in sprints or scrums as they call them in agile code. It's an interesting theory."

What Burns is getting at is a new working methodology for collaborative teams: live and unlocked versus static and baked in. Edits, color corrections, visual effects, titles and subtitles are all non-destructive, saving time when changes need to be made. Moreover, every member of the team can see changes from other collaborators in real time. Burns says it's about making sure nobody sits on their hands waiting for a shot to re-render before anyone else can see the results. It's made possible by recent developments in editing software and hardware, mainly GPU-accelerated subsystems that can render in real time, as well as advances in shared storage

"I call it 'war on the progress bar,'" Burns says. "Copying files onto your workstation, editing them locally, and then exporting them for use in the next phase of your workflow might have worked back when everything was in the same format, all the material was stored locally, and the editor didn't have so many different departments looking over their shoulder. We believe in declaring war on the progress bar. Don't copy that media. Edit directly from shared storage so you don't have to spend 15 minutes getting set up or exporting your work to the next silo. Just keep going."

"Editors like to get their head in the zone. Anything that breaks that flow is going to break their creativity. And war on the progress bar means: don't break that flow."



True Collaboration Means Going Global

When you're building an efficient editorial pipeline, it's important to remember that collaborative editing means different things to different people.

“To a news operation, collaborative editing means the raw material comes into the facility and one team will edit for the 1 p.m. show, one team will edit for the bulletins, another team will edit for online and another team will edit for graphics. So: multiple teams working simultaneously with the same raw material. They're all collaborating to make the output for that facility,” Haywood explains. “For a Hollywood post-production studio, where different teams specializing in different parts of the workflow are geographically distributed, collaborative editing means a bit of work in Los Angeles, and then a bit of work in New Zealand, a bit of work in Singapore and a bit of work in London. It may be a chase-the-sun workflow. They're all working on the same output, but not necessarily at the same time."

Part of the new collaborative landscape is VFX facilities, whose work has become ubiquitous in all genres, not just Hollywood tentpoles .“Even the silliest non-blockbuster picture will have more VFX than anybody realizes,” Burns says.

“As just one example, every single show in China goes through sky replacements to present everything shot in Beijing under a blue sky. It's now routine. An editor has to cope with material incoming from the VFX department as well as from the camera department, and in all kinds of different formats."

And those working formats are more varied than ever. Gone are the days when every editing session necessitated a lengthy process of transcoding footage into a standard format dictated by the software vendor. That's important when the editor is expected to deal with footage shot on everything from high-end digital cinema cameras to palm-sized camcorders, one-off action cams — and in some cases even iPhones. “It's a combination of codec development and processing hardware getting cheaper,” explains Dell EMC's Tom Burns, “Adobe's Mercury Engine will run on any GPU installed in your workstation, and that means you no longer need to transcode everything into a working codec. Now you can just edit Canon Raw, R3D files, ProRes — the mixing and matching of codecs is the most important thing that has happened in the last five years or so."

New Viewing Habits Bring New Editorial Expectations

Netflix and the popularity of binge-viewing is putting continually greater strain on post-production infrastructure, as it has become important — for the first time in television history — to keep as many as eight, 10 or 12 hours of content available and open for changes throughout the production of a complete season of a show. "Say you make a script change in episode 8 that requires you to fix something in episode 2," Burns suggests. "That's really hard on the post house. They have to keep all 13 episodes of a show unlocked and then deliver the whole series in one go."

Another challenge? The sheer volume of content on a typical project. With digital acquisition, shooters often take a less conservative approach to how much time they spend rolling. In short, they don't turn the camera off. "There's a big paradigm shift that came with the transition to nonlinear editing," Haywood says. "People who learned in the film days, when film was expensive and difficult, came to you with very few rushes — but exactly the right rushes. Now, some people literally don't think; they just shoot. And that makes post-production much more of a challenge, because you have so much more footage to sift through.

"You could say, 'This is terrible. This camera guy is an idiot. He should have edited in camera.' Or you could say, 'This camera guy is a genius. He's giving me everything I need."

Still, coping with the increased volume of footage is a new chore for editorial. "Logging and tagging material is 10 times harder because there's 10 times as much material, never mind high frame rates or anything like that," Burns says. "For a feature film, the on-set DIT used to process maybe one or two TB a night of new content and send it to post. But projects like *Billy Lynn's Long Halftime Walk* show you where we're going. They were shooting HFR, 3D, and 4K, and they generated 40 TB of content a night for two months."

Of course, not everyone is going to shoot movies in HFR and 3D. But it's a sure bet that those numbers are going up, not down.

How will we cope? One clear trend is that the process of logging footage is going to become increasingly automated, thanks in part to machine-learning techniques that can be integrated with the editorial infrastructure. "Everyone loves being able to consume metadata, but I haven't met a single person who says, 'I love to input metadata!'" Haywood observes.

"The trend is toward automating metadata, which makes editing easier. And if the AI can mark up shots that might be of interest, then the next logical step is to have the AI propose an edit. We might see a lot more of that in the future, particularly for news. I can see AI composing news reports not far down the road."

10 Tips for Making the Most of *YOUR* Collaborative Editorial Workflows

1. **Combine high-performance (more expensive) and high-density (more affordable) storage in the same namespace to create a system that makes budgetary sense for your shop.** "Every creative with a blank check would like to buy all the flash storage in the world, but that's not economically viable," Dell EMC's Simon Haywood says. "We're seeing people getting really interested in the new Isilon Generation 6 ranges, combining the top-performing F800 all-flash storage and the A2000, which is the densest storage. Combining the two together into a tiered storage solution is making tremendous sense for quite a few post-production shops."

2. **Do the math.** Cost-of-ownership calculations have cloud storage growing in favor vs. tape archives. "My personal view is that LTO tape definitely has a role in offsite disaster recovery," Haywood says. "Increasingly, it's no longer the right answer for nearline. We see the ECS product, our object storage platform, as quite compelling if you do the cost of ownership calculation versus tape. It's tremendously scalable and geographically dispersed."

3. **Use MAM, smart folder structures, and structured keywording to make it easier to find the files you need quickly.** "You can spend half your day looking for tools to do the work and you never get the job done," Haywood says. "Look at a professional who wears a toolbelt that keeps all of their tools easily accessible. You need to keep track of your stuff. Be very efficient about the way you work. Untitled Sequence 1 and Untitled Sequence 2 are not going to mean anything to your future self."

4. **Proxy workflow is back; make the most of it.** "We're seeing our entertainment customers using a proxy workflow in Premiere to turn 4K material into lightweight files that can be shared," says Adobe's Matt Gyves. "And if you're doing 8K, especially, and trying to edit on lightweight laptops, it's hard. Rather than fight that, we implemented a proxy workflow that means you can still collaborate with people even if the assets you're shooting are very high resolution. It's more of a processing issue than a storage issue now, and proxies is a solution that works for the majority of users."

5. **Assess your willingness to move media around. If bandwidth is not a challenge, you don't need to put everything in the cloud to collaborate on it.** "Adobe's Team Projects hosts the production data — the metadata about the decisions you're making," Gyves says. "We don't dictate where the actual media lives. In that model, you can have lots of different workflows. You could be in a traditional post environment, with everyone attached to shared storage, so the media stays put but you collaborate with the metadata. In another workflow, you might put high-res proxies in Creative Cloud, so you're uploading and downloading media. Maybe you have cloned drives with mirrored images of the media that get sent around. Or it could be another cloud storage service like Dropbox. If you can see it and mount it, you can use it."

Getting out of the Way of The Creative Process

Heading into the future, the challenge for technologists will remain keeping up with — and staying out of the way of — increasingly demanding creatives who expect more flexibility and support from their toolkits. Haywood notes that it never gets easy, as loosening up one bottleneck in the pipeline just reveals the next one clogging the way behind it, from storage to networking to workstation hardware to software architecture. He says it feels like a game of Whac-A-Mole.

With a live and unlocked workflow, the VFX house can deliver its shots on schedule and then keep working on those CBBs without holding up the rest of the team.

“Orchestration layers are so important [in collaborative workflow architecture],” he says. “Collaborative editorial needs to have open and well-integrated version control to allow for CBBs to be instantly updated without a manual export and import process."

> "Artists don't care about infrastructure. And that's as it should be."
> Tom Burns, CTO, Media & Entertainment, Americas, Dell EMC

“That's one for us to solve as technology vendors, and we solve it by being invisible,” he says. “The minute an editor or creative has to solve a problem with their computer, or their network, or their storage, we've interrupted their flow by giving them a boring job to solve. We strive to provide solutions that are invisible. Isilon is low maintenance, fast, efficient storage that's easily scalable, does its job, and is invisible. And that's what creatives need."

Burns thinks collaborative editorial processes can improve the “could be betters,” or CBBs In VFX lingo, those are the shots that are good enough to go into the show, but could benefit from a little more work.

On that level, collaborative editorial is all about getting out of the way and letting creative people be creative. That's what live and unlocked workflow is all about — allowing for a fluid working environment, rather than snarling creatives up in rigid patterns and forcing early decisions. Burns stresses that it's important for vendors not to get hung up on their expectation of how creatives should use their technology, and instead learn about how creatives really are using their technology. “I used to get frustrated with artists,” Burns admits. “I'd say, ‘Why can't they just use the tools the way they're supposed to be used?' But then I realized the infrastructure doesn't matter. It's the creativity that gets bums in the seats, not the fact that someone is delivering 1.2 GB/second behind the scenes.

10 Tips for Making the Most of *YOUR* Collaborative Editorial Workflows

6 **Hire the best talent, not just the talent that happens to live close by.** "You used to have to hire people who could sit in editorial suites located close to one another, but now people can start working together from wherever they happen to be located," says Adobe's Matt Gyves. In fact, he cites Adobe Stock, with its abundance of stock images, video, motion graphics templates and more, as another interesting and efficient way to connect creatives. "That's also a form of collaboration with others, but it's more like crowd-sourcing of assets," he says. "It taps into the larger creative community to access specific material, while you're working on your project. It's incredibly efficient."

7 **Have a plan for communicating and collaborating.** “Collaboration often means great distances, and those great distances can introduce natural breakdowns in communication," Gyves warns. “Instant messaging and chat tools can be useful for on-the-fly communications, but regular shared reviews help keep remote teams on the same page."

8 **Check in your work and/or save your changes often.** “Interestingly, one of the things we found in very early trials of Team Projects is that checking your work in, which means sharing your changes, is akin to saving," Gyves says. “And some of the most experienced editors I've worked with hit Command-S or Control-S as second nature. You need to make sure you're constantly capturing those changes."

9 **Make sure you have an accessible history so you can undo the inevitable mistakes.** “Sometimes people are going to make mistakes," Gyves says. “Giving them the option to go back and undo is important. Make sure there is a history so that you can undo the inevitable mistakes that can happen. Team Projects has a built-in history, so you can go back in time."

10 **Know what story you're trying to tell and how you're going to tell it.** “There are fundamentals of production that don't change, no matter how good the tools are," Gyves says. “You have to know the story you're trying to tell, and you have to be clear with your collaborators about how you're trying to tell that story. The disciplines of good post-production remain the same. You're just doing it now across distances that weren't previously possible. We like to say that we try to give you a set of tools so that, whenever creativity strikes, we have a canvas for you to express what you want to, in whatever way you need to. And sharing those creative ideas is so much easier now through Team Projects and the Creative Cloud."

How Collaborative Editing Lets You Do It *Your* Way: A Conversation with Adobe's Matt Gyves

File-based workflow and networked storage have utterly transformed content creation. For many decades, film and television productions were wedded to physical media like 35mm film and Betacam tapes. But as we entered the 21st century, the digital floodgates opened. Movies such as Pleasantville, O Brother, Where Art Thou? and Chicken Run were among the first to be scanned to digital files, which allowed more elaborate manipulation of the digital image than traditional lab processes. In broadcast, growing adoption of Panasonic's P2 technology meant that footage was captured and saved as digital media, rather than recorded on videotape. There were growing pains, especially as DPs and others had to give up familiar and beloved traditional formats. But the potential for reducing costs, faster turnaround times and increased creative scope during post-production made the transformation inevitable.

And there was the promise of something else, too — if all the media files for a project were kept on the same, centrally located storage system, multiple users could access those files, sharing the workload on a given project. Sure, there were obstacles in the way. But the possibility of a truly collaborative editorial workflow, where the rigidity of the post-production timeline gave way to more flexible and creative ways of working, was enticing.

For software vendors, helping post-production veterans come to terms with the enormity of the changes, and how they serve the needs of creatives, is a big part of the development process. Adobe's Director of Strategic Relations Matt Gyves says change can come slowly as people's mindsets catch up with technology.

"We know people working in post today the same way they worked five or even 10 years ago," he says. "It's human to cling to what you know but, for most workflows, there are more efficient approaches available to content creators today."

"Collaborative editing takes many forms," he says. "It can be sharing out different tasks or different disciplines. You can be sharing different sections of an episode. Or maybe I'm doing one episode in a series and you're doing another episode. We might share the previously-ons, or we might share our assets for the title sequence. Where collaborative workflows have not worked well in the past is when they're too rigid. We see so many users who want to do it in slightly different ways. So we want to create a framework for collaboration."

In Adobe's vision, the NLE becomes the hub of a consistent, flexible and seamless collaborative workflow where all the other tools talk to Premiere Pro. "With Team Projects, you have your project metadata hosted in Creative Cloud, and invited collaborators can work on the same project, checking in changes as they go," Gyves explains. "Now that you've got powerful color tools with the Lumetri Color Panel in Premiere Pro, a colorist can apply the grade and, by sharing those changes back into Team Projects, the color decisions are applied to your edit.

"And, because Team Projects now supports a Dynamic Link workflow with After Effects, VFX and motion-graphics artists can do their work on their own workstations, wherever they're located — and when you get those changes, you will see all of that work reflected in your timeline."

Adobe recently added a powerful Team Projects feature for collaboration in Creative Cloud software.

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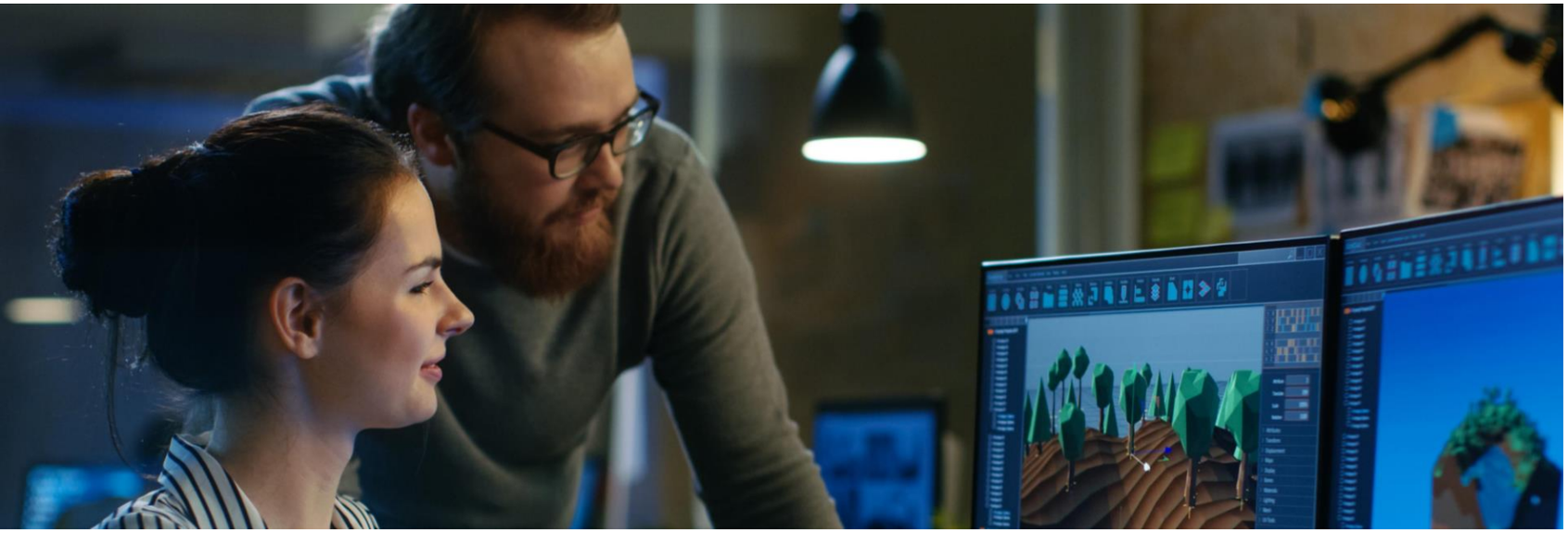
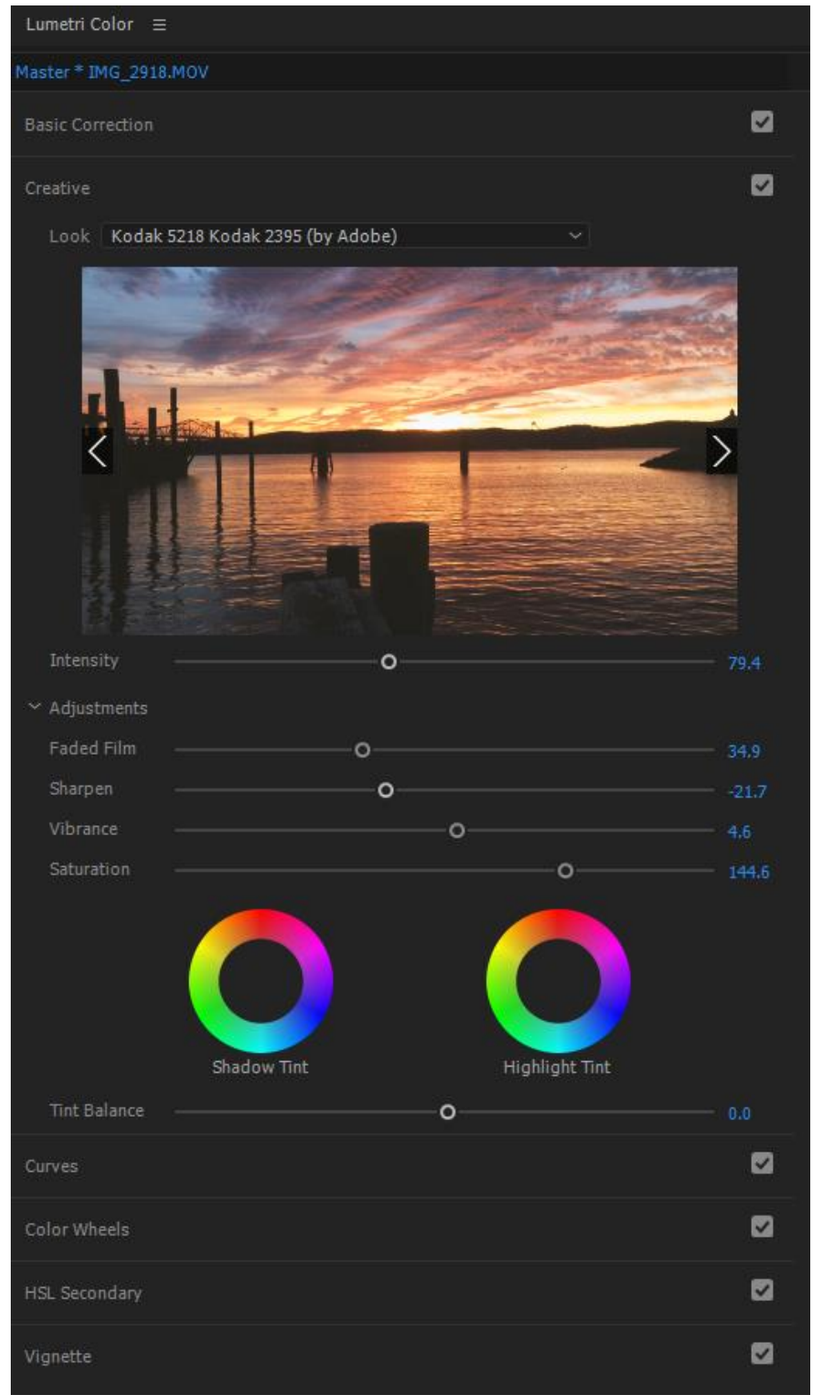
Collaborative editing does not mean simultaneous editing by different people on the same timeline. According to Gyves, the breakneck pace of pro editorial is way too fast for that kind of methodology to make sense.

“Imagine that I'm about to make an edit, but someone else on my team makes one just before I do and it pulls all the clips to the left 12 frames, and all of a sudden I'm in the wrong place. That's not going to work. But what does work is having different collaborators checking in their own changes, for example for sound or color or assembly edits. Team Projects has built-in version controls and conflict resolution that make it easy to keep track and even retrieve interesting ideas from different versions."

The biggest change that comes with collaborative editorial is the move from a serial workflow, where each part of the process — edit, color, VFX, audio — must be completed before the next one can begin, to a parallel workflow where different aspects of the project are being updated at the same time. For example, some directors may be ready to explore the ways color-grading can help tell their story as soon as shooting begins.

“That has not always been easy," says Gyves. “If you're sitting in an editing environment and you're looking at something that's badly white-balanced or slightly overexposed shots, that can be distracting. And if that viewer is your investor, it can sidetrack the storytelling aspect of what you're trying to create. So we're trying to give you the opportunity to use color and light whenever you need to in your workflow, whether that's before you go and shoot or at the end as a final color pass." The same goes for new Adobe Premiere Pro features like Motion Graphics templates and the Essential Graphics panel, which bring motion-design tasks that formerly demanded the skills of a dedicated After Effects artist into the editing application.



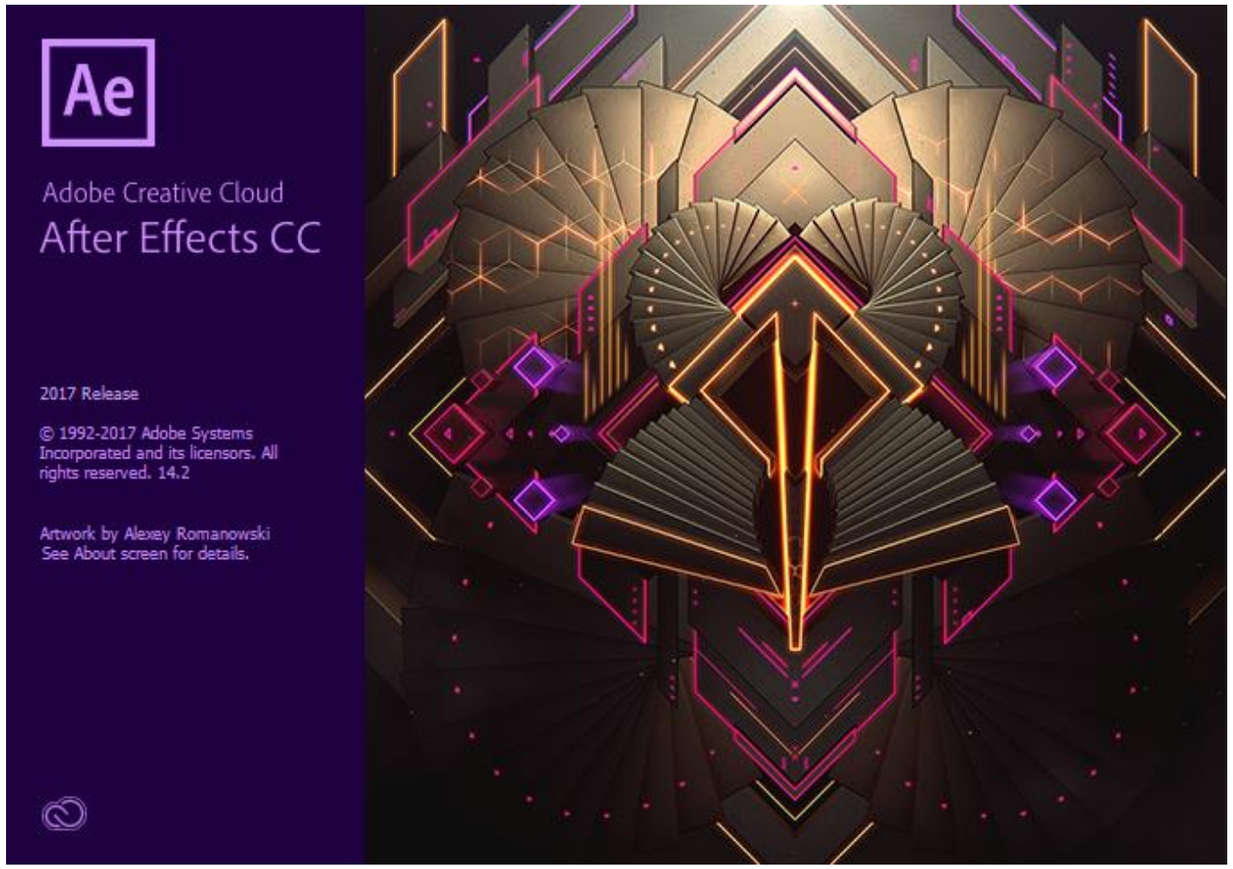


Premiere Pro's Lumetri Color Panel leverages Team Projects to apply color decisions to a collaborative editing project immediately.

Likewise, some creators want to finish a piece and head for the dubbing stage at the very end of the process, while others want to be developing and experimenting with their audio as they go along. Gyves says that sort of question reflects an ongoing cultural change on the part of Adobe's users. "When I started making TV programs, it was very clear — you had a camera operator, a sound recordist, a director, a producer, an editor, a colorist, a dubbing mixer," he recalls. "It was very segmented. That still exists, but the boundaries between the different specializations are much less pronounced, and most professionals need at least basic proficiency in a broader range of post-production tasks. Some of it is forced upon them, but mostly it's because the tools make it so much easier and people are choosing to do more of these jobs themselves."

For the next generation of storytellers, collaborative editorial tools provide a dynamic creative environment that makes shared production workflows efficient and lays a broader foundation for creative and professional growth. Gyves cites Gareth Edwards as an example — Edwards wrote, directed, shot, and did VFX work and finishing on his feature debut, *Monsters*, an across-the-board immersion in process that gained him the chops he needed to sit in the director's chair for *Godzilla* and *Rogue One*.

"Every workflow is different, but we're seeing more and more people who want to blur those disciplines," Gyves says. "We try to give you a set of tools so that when you're ready to work, all the tools are ready at hand. People who are coming into the industry today are people who have been born with these tools in their hands. They all learn After Effects. They all learn editing. And they all learn sound. It's quite incredible to see a new generation who are masters of all these disciplines."



Work completed by an artist composing VFX or graphics elements on another workstation running After Effects updates to the editorial timeline via Adobe's dynamic link workflow.

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