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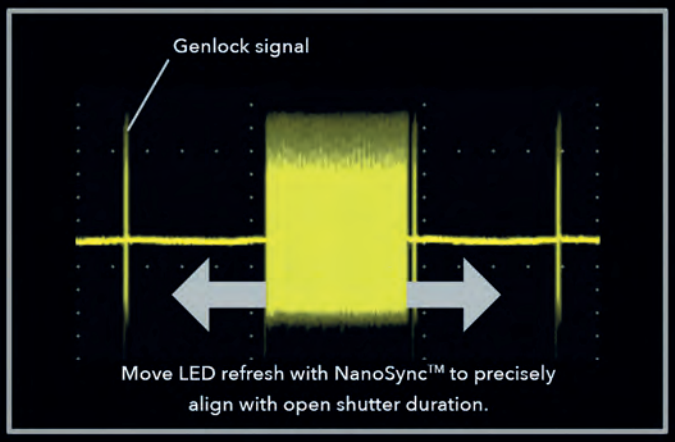

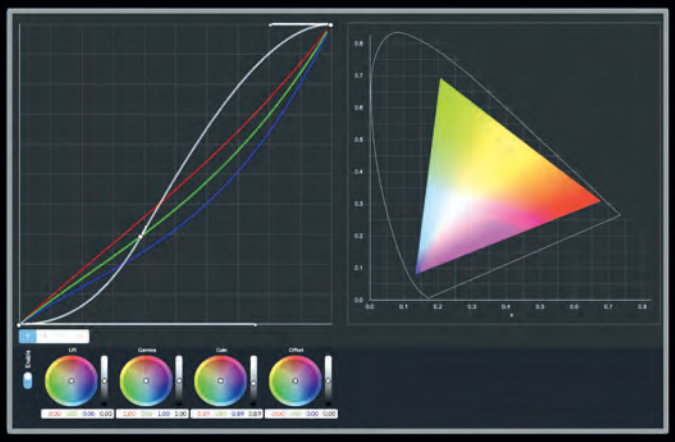

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Enter the metaverse

An immersive virtual world was once the stuff of sci-fi, but now it's upon us. Experts paint an exciting picture of things to come, including likely new directions at all levels of production

INTERVIEW. Lee Renwick

Part 1

JAMIE ALLAN
Media, entertainment & broadcast industry lead EMEA, Nvidia

MARCUS BRODERSEN
CEO, Pixotope

JEREMY HOCHMAN
Founder, Megapixel VR

DAVID LEVY
Director business development, global solutions, Arri

CARL NOBLE
Pro video creative lead, Scan

ALANNA ROAZZI-LAFORET
Co-founder, Decrypt Studios

PAUL SALVINI
Global CTO, DNEG

While production technologies and practices are constantly evolving, there are only a few great epochs of filmmaking. In recent decades, the prevalence of CGI and dawn of digital cameras have been perhaps the most notable turning points. Looking ahead, though – and not quite as far as some may assume – we may see the most pivotal development of all rove into view. In the metaverse, we find a proposed wonderland of media content. Once established, it's sure to change the game as we know it. But what, exactly, is in the pipeline?

In providing many of the crucial blocks of the production metaverse, how are each of you feeding into a larger whole?
PAUL SALVINI: DNEG specialises in the creation of high-end digital content. Worldbuilding would be a concise way to put it. They can be highly realistic and

representative of our real world, like our work on *Chernobyl* or *Last Night in Soho*, or creative imaginings of new worlds, like *Dune* or *Blade Runner 2049*. Being able to explore these realms in a shared and collaborative way will not only help to create outstanding films – it will also open the door to fresh interactive experiences.

DAVID LEVY: Arri specialises in designing and manufacturing physical and digital tools, as well as solutions for content creation. Fortunately, this means we are in a privileged position to truly contribute to the development and growth of the metaverse, particularly as a more visual platform for storytelling.

It is generally understood that the metaverse will be made up of virtual worlds. Some will be immersive, interactive, photorealistic digital environments, which will twin with those in the physical world. Some will require the capture of real-time content, such as sporting events, concerts and news. Arri's understanding of digital photorealism and efficient high-quality content capture means we have a lot to offer across both areas of development. A fantastic example of this is our journey into virtual production and mixed reality. We've used our experiences and observations to refine, develop and establish workflows and standards. We've been able to deliver some of the most technologically advanced mixed reality studios in operation today.

"It's generally understood that the metaverse will be made up of virtual worlds. Some will be immersive... some will require the capture of real-time content"

JAMIE ALLAN: The term metaverse is a broad description of the many types of 3D virtual worlds we will see as an evolution of the web. One essential thing for this is for these worlds to have a common foundation of how they are presented, experienced and – most importantly – connected. In the early days of the internet, HTML was adopted – meaning every experience, on every website, from every browser became consistent. We need that kind of plumbing, so all virtual worlds provide a consistent experience. We believe Universal Scene Description (USD) will be the core of that.

Built on USD, Nvidia Omniverse is our platform for simulation and 3D design collaboration, that serves as the connective tissue for physically accurate 3D virtual worlds. It enables designers, artists and reviewers anywhere around the globe to work together in real time, across leading software applications in a shared virtual world.

CARL NOBLE: The building blocks of the metaverse, such as real-time 3D graphics, spatial computing and advanced display interfaces, can require so much in terms of computing power. With Scan's expertise and background in powering advanced workflows, providing solutions to power the metaverse is our area of focus.

Scan 3XS workstations are designed to seamlessly process 3D, VR and XR workflows. We also provide expertise and services, such as our dedicated vGPU platform, supporting public and private cloud workstations and access to Nvidia's Omniverse Enterprise.

MARCUS BRODERSEN: The metaverse is ultimately about people accessing experiences, and those are all about how we drive and deliver content. At Pixotope, we're building a platform for virtual production, which we see as one perspective of the metaverse.

Our mission is to create viable paths for all creators – especially those within traditional video-based media, such as broadcasting, film, advertising, live events and streaming – to enter into the virtual production space. We do this by creating tools to create and integrate fully interactive, real-time, photorealistic graphics with high-end live video.

"There are two major developments going on right now with regards to the metaverse. One is a set of ecosystems... the other is a set of technologies"

JEREMY HOCHMAN: There are two major developments going on right now with regards to the metaverse. One is a set of ecosystems, designed to create virtual worlds that people are meant to interact inside of. The other is a set of technologies – hardware and software – that will place people into these virtual environments.

Megapixel does a heck of a lot more than just LED video processing. We drive innovation in high-bandwidth data distribution, invent and create display technologies – such as MicroLED SMD pixels, light field display technology and more. Most of this tech goes into special projects or is licensed by third-party manufacturers, but I'm excited to see how it gets put together over the next few years. Today, we fit in by ingesting video data from Unreal or Unity and distributing it – along with a massive amount of metadata – to LED tiles, to output to large displays. We're bridging the gap between metaverse worlds and the displays they're consumed on.

ALANNA ROAZZI-LAFORET: At Decrypt Studios, we create metaverse experiences and activations for clients, that focus

on real human connection – no matter where the users are in the world – in environments that are exciting, unique and new.

How will the metaverse shape production workflows within your respective areas of expertise?

ROAZZI-LAFORET: The metaverse and larger Web3 community will introduce more democratised and community-based methods of building and marketing projects than currently exist. For example, funding film projects with NFTs and selling digital or IRL (in real life) merch in metaverse rooms. There are going to be many more entry points than before, too, and influence will shift from traditional gatekeepers to the larger community. For example, Decentralized Pictures launched their democratised film fund in May 2022, and have created a community-based voting methodology to determine which projects and artists will receive support from their non-profit foundation.

NOBLE: The idea of building entire virtual worlds requires collaboration on a colossal scale, relying on a mix of professionals with different creative talents, technical abilities and geographical locations. So many collaborative possibilities will be opened up.

We are already seeing the immersion of real-time platforms, such as Omniverse, with end users changing how they approach content creation. Productions are now able to budget a workflow as OPEX – as opposed to CAPEX – due to the lower requirements on individual workstations and the centralisation of creative applications. It's going to be exciting to see how tools like these will be adopted in the creation and delivery of assets for the metaverse.

LEVY: Arri's hardware sits very much in the production phase of a project, but we are seeing an increased need for information about our hardware during the previz and techviz stages. Our products deliver low-latency camera, lens and lighting data directly into the game engine, providing more accurate visual behaviours in virtual environments.

ALLAN: Building internal virtual worlds in which artists create will be key to success. Our focus is on connecting the tools already being used, such as Autodesk's Maya, 3ds Max and Epic's Unreal Engine, rather than creating new walled gardens that make it harder to realise multiplatform delivery of the same content to different virtual spaces.

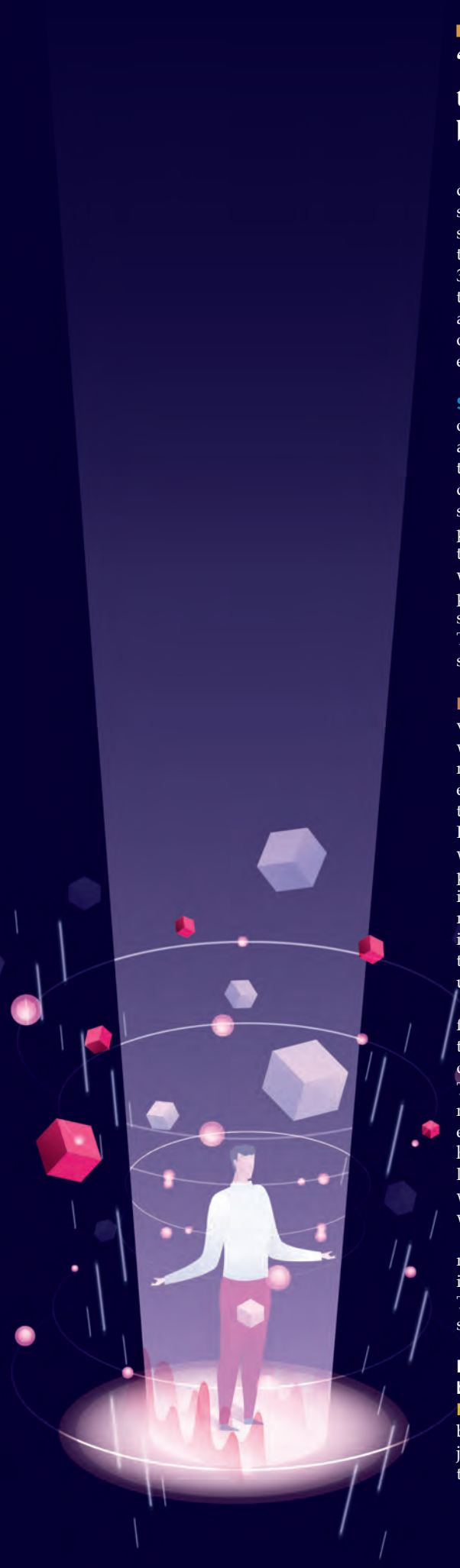
BRODERSEN: Many of the workflows and roles in traditional production do remain the same when creating for the metaverse. For example, if we think of the role of the lighting designer, it's just as critical in virtual production, if not more, as it is on a physical set.

New workflows inevitably expand horizons. What's the creative potential?

HOCHMAN: The more tools and infrastructure that get built for metaverse applications, the more worlds and scene options will be available to directors, art designers and other key players. It will become an incredible backlot, available for anyone to use and interact with.

In the future, especially with GhostFrame and faster cameras, I can imagine multiple DOPs

> **"Many of the workflows in traditional production do remain the same when creating for the metaverse"**



"I would put flexibility above all else. Don't go into things with a preconceived notion of how it must be done, because it's constantly changing"

capturing different aspects of a scene simultaneously. I see not only four simultaneous cameras, like we can do today, but hundreds, giving real-time 360° capture. Imagine a single scene with thousands of vantage points. In real time, a viewer could change their perspective, or a director could create a fly-through, even after wrapping.

SALVINI: Artists from different parts of the production pipeline – such as animation, lighting and layout – are able to simultaneously collaborate on the development of a shot. They can also scout a world virtually, which is a huge plus. Up front, it allows filmmakers to explore locations and find the best ways to use them to benefit a story. In production, filmmakers can treat a digital set like they would a real-world one. They can adjust all the elements of a scene with complete creative control.

LEVY: As the metaverse will be, by its very nature, a live system, production workflows are likely to mimic those more commonly found in broadcast and events, but then merge with the real-time technology found in gaming and beyond. Effective previz and techviz workflows will mitigate the associated risks. The potential value of those assets is really interesting. If planned correctly, the initial rough previz creation will continually improve in quality and sophistication, to the point it becomes the final pixel asset used in the production.

As the digital divide narrows, filmmakers globally will have access to the biggest and most sophisticated distribution channel in human history. The metaverse promises ease and access not only for individual filmmakers, but entire nations to share their cultural heritage. It has the potential to deliver a level of visual immersion and interactivity which could usher in a completely new way of storytelling.

What I love is that we have access to many of the key technologies that are instrumental for building the metaverse. Those technologies enable us to look at a script and say, 'we can keep it in'.

How might the existing skills of creatives be adapted to fit a new virtual world?

NOBLE: It's easy to see what's currently being developed in the metaverse and jump to the conclusion that it will remove the need for filmmakers, as game engines are used to build these digital worlds. However, as the scope increases and creative demand grows with it, it's going to require professionals who have skills that filmmakers already possess. One fundamental aspect the metaverse shares with traditional filmmaking is that the whole experience is based on immersion and how close to reality it feels.

BRODERSEN: All of the traditional game and VFX asset creation skills, such as modelling, rigging and shading, will continue to be highly relevant – even if some of these processes become more automated and assisted through combinations of asset libraries, photogrammetry, procedural tools and machine learning-based synthesis.

ALLAN: It's more important than ever to keep on top of the latest advancements in core technologies, as well as building a good understanding of new elements, like USD and glTF files, which are likely to become standard building blocks of the industrial and consumer metaverse. You can consider USD the HTML of the 3D world, and glTF as the counterpart to JPEG for 3D content. Understanding these two formats will become increasingly important, as they do have deeper complexities than their 2D cousins.

HOCHMAN: When I created the first LED-lit sequence with Harris Savides and David Fincher for *Zodiac*, we were inventing how to do it as we went. There were no game engines to drive displays, so I had to write GPU shaders that could adjust content in real time. Everything was timecode driven, so the scene could be repeated over a lot of takes. Reflecting back on this, I view all of this technology as a means to getting better repeatability, and to do so means that the 'fix it in post' mindset has to go away. Everything is becoming pre-production and worldbuilding – something the metaverse is actually already set up for. Knowing how to drive game engines and digital assets is a must, but I would put flexibility above all else. Don't go into things with a preconceived notion of how it must be done, because it's constantly changing. ●

In part two, the experts explore how the viewer experience may change with the rise of the metaverse, and speculate on just how close we are to slotting the final pieces of the puzzle into place.